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Syphons.—T. J. Finch, F. Wirth (com.).

Sizing, &c.—W. Bywater.

Sluices, &c.—P. J. Martini and W. Muller.

Smoke (Preventing, &c.)—W. Turnpenny.

Sowing Seeds.—W. R. Lake (com.).

Spinning and Preparing for Spinning.—J. C. Ramsden, J. E. Wadsworth. T. Whitley, G. and W. H. Ingham, E. de Pass (com.), T. Guest and T. Brookes, J. King, J. H. Johnson (com.), J. J. Sachs, E. Sykes and W. Cliffe.

Springs.—T. Brown, J. H. Johnson (com.).

Stables, &c.—D. Grussen.

Stacking, &c.—J. Hancox.

Stamps (revenue), &c.—C. Kesseler (com.).

Stays.—E. P. Alexander (com.), F. C Nutter.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water Feeding Apparatus for Boilers.—E. Arnaud, J. Moulet and E. Ginoyer (com.), J. G. Wilson (com.), J. C. Mewburn (com.), W. R. Lake (com.).

Steam Engines (Stationary, Locomotive, and Marine).—H. J. Haddan (com.), A. W. Doery (com.), F. W. Durham, J. Imray, J. H. Johnson (com.), W. Apsey, J. C. Mewburn (com.), H. Thibault and T. Hawkins, J. D. Churchill, W. R. Lake (com.), J. G. Wilson (com.). A. and J. Hopkinson, L. Boyce, G. H. Corliss, E. B. Ellington, A. Dobson, H. A. Bonneville (com.), J. T. Howson and J. Tate.

Steering Ships, &c.—A. Lafargue, C. W. King and A. Cliff, S. B. Heathorn, H. Hirsch.

Telegraphs; Telegraph Printing Apparatus.—W. R. Lake (com.), R. H. Courtenay, E. C. Bright, R. M. Lockwood and S. H. Bartlett, C. H. Johnson.

Tilling and Cultivating, &c.—W. Sleep.

Tobacco and Snuff, Cigars, Cigar-Holders, Pipe and Cigar-lighters, Smoking Pipes, Tobacco Pouches, &c.—E. J. Kennedy.

Tramways and Tramway Carriages, Tramway, Locomotives.—F. C. Glaser (com.), H. A. Fletcher.

Traps for Drains, &c.—A. M. Clark (com.), P. M. Justice (com.).

Umbrellas, Parasols, &c.—W. E. Palmer, H. Shaw and W. Spencer, J. Forster, A. M. Clarke (com.).

Upholstery.—J. F. C. Farquhar, G. O'Brien, J. A. Daniel and R. Whiteley J. Reilly.

Urinals.—J. Smeaton.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of Fluids.—C. Pieper (com.), W. V. Ley, F. W. Durham, C. W. King and A. Cliff, J. D. Churchill, J. G. Wilson (com.), J. Smeaton, W. R. Lake (com.), S. Griffiths, C. Burgess, D. Young, H. A. Bonneville (com.).

Varnishes, &c.—C. Kesseler (com.), J. B. Freeman.

Velocipedes, Bicycles, &c.—J. Dutton, C. Garrard, H. J. Haddan (com.), R. Green, L. Hardaker, J. Barling, J. Lucas, M. H. Gerling and R. E. Rumsey.

Ventilation: Supplying and Purifying Air for Buildings, Mines, Ships, Carriages, &c.—J. Miller, J. O'Brien, T. H. Thompson, H. P. Holt, J. W. Melling.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—W. Milward and B. Richards, A. J. Forbes, J. Wetter (com.).

Water-Closets, &c.—H. J. Haddan (com.), W. R. Lake (com.), J. and F. Hubber, J. Smeaton, P. M. Justice (com.).

Weaving, Braiding, Plaiting, Preparing for Weaving.—P. Young and J. Matthieson, G. Harling, R. Shackleton, P. and J. Banks and W. Slater, S. Quarmby, W. Morgan-Brown (com.), J. H. Johnson (com.), W. Northrop, J. H. Brierley, J. Kippax, R. Greenwood and W. H. Hayhirst, T. Sagar, H. Booth, W. Brookes (com.).

*** The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

PAPER CLAY.

In view of the rapid rise in the price of paper, and the complaints of the paper makers with regard to the scarcity and increasing costliness of all sorts of paper stock, it is gratifying to see that one source of such raw material is not likely soon to fail us. Whatever may happen to rags, wood pulp, and the thousand other sorts of fibrous material supposed to enter into the composition of paper, the clay bank promises to be inexhaustible. True, the majority of people who pay a high price for paper may have a prejudice against that material, but evidently the owners of the clay banks have not; for in a prominent journal devoted to the paper trade, they boldly print a large cut of their "clay works," showing a long stretch of snowy bluff out of which a huge section has been cut, presumably to supply the needs of "all first-class mills, east and west," to whose owners they refer for evidence of the excellence of their clay.—*Scientific American.*

NEW WALL TENT AND STOVE.

A stove is often a necessity and always a desirable comfort in camp, for even in midsummer there are chilly mornings and evenings and rainy days, when the comfort of a little heat in the tent is greatly to be desired. All who have had experience in camping know that the proverbially unmanageable stove-pipe is most unmanageable in a tent. After ripping a hole in the tent, and getting the stove-pipe in place, it is no uncommon experience to replace it again and again, after the wind has detached it from the stove and caused it to tumble; and should the pipe be permanently attached to the stove, the matter is made even worse, as not only the pipe but the stove also must sooner or later come down. These difficulties are not by any means all that can be brought as objections to the ordinary camp stove and its accessories. It is a cumbersome addition to the equipage, and takes up a great deal of valuable room in a tent where there is very little room to spare.

The Hobbs tent frame and stove overcome the difficulties enumerated, and afford a compact, light, and efficient cooking and heating apparatus, well adapted to the wants of military men, sportsmen, surveyors, and engineers, for camp meetings, pleasure camps, and for all who dwell in tents during a portion of the year. It is particularly well fitted for cooking, and its application to kitchen tents will not be among the least valuable of its uses.

The invention consists in substituting for the ordinary tent poles a frame composed of a ridge and hollow upright of galvanised sheet iron, and a wooden pole of the ordinary form.

The hollow upright, forming the stove-pipe as well as one of the supports of the tent, is of a special patented construction, securing great strength and rigidity, and at the same time being very light. It sets in from the end of the tent a sufficient distance to prevent injuring the canvas by heating, and its upper end is provided with a chimney cap or cowl, which projects over the canvas. Near the lower extremity of the hollow upright a stove is attached in such a way that it accompanies the tent in all its swaying motions. The stove is supported by an upright and a single hinged leg, and is readily and easily placed, and as readily detached and put aside when not in use.

This useful invention has been covered by two patents by Capt. Charles W. Hobbs, of the U.S. Army. Mr. William A. Percy, of Plattsburg, Clinton county, N.Y., is agent and manufacturer. The inventor may be addressed in care of Mr. Percy.—*Scientific American.*

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The organisation of the American Society of Mechanical Engineers was completed April 7, at a numerously attended meeting in the hall of Stevens' Institute, Hoboken. The society will embrace members, honorary members, associates, and juniors, and is open to mechanical, civil, military, naval, mining, and metallurgical engineers, and architects of practical attainments as designers, constructors, or teachers, if they apply for full membership. A junior must have been in practice for two years, or must be a graduate of an engineering school. The first regular annual meeting will be held in this city in November next. The election of officers resulted as follows:—President, R. H. Thurston; vice-presidents, H. R. Worthington, Coleman Sellers, Eckley B. Coxe, General Q. A. Gillmore, U.S.A.; Wm. H. Shock, U.S.N.; Alex. L. Holley; managers, W. P. Trowbridge, Theo. N. Ely, J. C. Hoadley, Washington Jones, Wm. B. Cogswell, F. A. Pratt, Charles B. Richards, Wm. B. Bement, S. B. Whiting; treasurer, Lycurgus B. Moore.

Reviews.

BAZALGETTE'S REPORT ON MAIN DRAINAGE OUTFALLS.

"Thames Conservancy and Main Drainage Outfalls." Report by SIR J. W. BAZALGETTE, C.B., on the "Arbitration between the Metropolitan Board of Works and the Conservators of the Thames." London: Judd & Co.

THIS pamphlet contains Sir J. W. Bazalgette's report on the above subject, in full; it is of a very exhaustive and informatory character. The following extract from its concluding pages will enable our readers to understand the gist of the matter:—

The Report of the Arbitrators, which the Umpire has endorsed thus, concludes:—"The Barking and Halfway Reaches, where three banks are situated, are now *better for navigation than they were before the Outfalls* were opened,—that is to say, vessels of greater tonnage and greater draft of water can now steam up or down, or can now be towed up or down, the river than the vessels which could pass in these manners before the dredging was executed; but at times, viz., near low water, sailing vessels of a certain draught of water cannot make as long "boards" when tacking to beat up or down the river as they could before the banks came into existence. In this limited sense only do we determine the banks to be obstructions to navigation.

"That each of the three banks has arisen from the dredging operations in Barking and Halfway Reaches carried on by the Conservators of the Thames, or sanctioned by them, such dredging operations having removed material and having increased the sectional area of the river and altered the direction of the flow of the currents and tide so as to produce a diminished velocity in those parts of the Reaches where the banks are situated, thereby causing a deposition of matter suspended in the river and the formation of the three banks.

"That the water in the tidal portion of the Thames contains a considerable amount of suspended matter, derived partly from the basins of the Thames and its tributaries, partly from the washing away of the foreshores of the tidal estuary, where unprotected, partly from material brought up from the mouth of the river by the flood tide, partly from sand and mud stirred up in the course of dredging operations, partly from denudation of the river bed, partly from sewers in districts outside the metropolitan area, and partly from the sewers of the Metropolitan Board.

"The proportion contributed from this latter source is small as compared with the total amount of suspended matter in the whole volume of tidal water which flows past the outfalls on every tide.

"That the three banks are composed of matter which had been held in suspension in the water, and had been derived from the several sources above mentioned. Whilst, therefore, the sewage from the metropolitan outfalls may have contributed to their contents, the three banks cannot be said, in the sense of the Act of 1870, to have arisen from the flow of sewage at the outfalls, and we are therefore of opinion that the Metropolitan Board of Works should not be called on to remove, or contribute any portion of the expense of removing, the three banks or any of them."

The inquiry has been an exhaustive one, and the decision of the arbitrators is unanimous and so decisive in its terms that it may be said, for the next generation at any rate, to have set at rest the agitation which has been so needlessly fermented during the last ten or twelve years.

The effect of the award, therefore, has been to save a useless expenditure of public money in dredging away mud banks actually caused by such dredging, and liable to more rapid accumulations of mud in proportion as the dredging was increased. The misconception of the Conservators as to the nature and real cause of these accumulations, had it not thus been clearly and authoritatively explained, must have resulted in the ultimate removal of the outfalls to sea at an expenditure of millions.

The inquiry was narrowed, doubtless under the advice of the Conservators' counsel, to the formation of the banks near to the outfalls, because they saw that sufficient evidence could not be produced to justify the smallest hope of a decision in favour of the more wild and groundless statements that the banks above and below the outfalls were formed by sewage deposits from them, or that the water in the river is polluted by them to such an extent that it can be called a nuisance, or is even perceptible to the senses.

"BROOK'S POPULAR BOTANY," No. 1.—This is the first number of a new serial devoted to botanical subjects. It is illustrated with coloured plates, and appears to be a very useful work. The publishers are J. A. Brook & Co., 282, Strand, W.C.

"NIGHT AND DAY."—This interesting record of the philanthropic works which are under the guidance of Dr. Barnardo still continues to sustain its well merited position.

POSTPONEMENT.—We are compelled to postpone our review of "Studies from the Morphological Laboratory in the University of Cambridge." Edited by F. M. Balfour, M.A., F.R.S.

SONNET

On viewing the Picture of "Cleopatra's Deadly Resolve in the Temple of Isis," by Madame de Steiger.

IN Isis' Temple sits the mighty Queen
Draped in a gown of gossamer and gold;
Thro' which her lovely form, fair to behold,
Peers; sweet as peers the moon thro' silver sheen,
When misty vapours veil the fairy scene.
But o'er her brow some mystery seems to fold,
And in her eyes her future fate foretold;
With anger burning, passionate her mien!
Her dreams of death, of Antony, and all
The splendour of the past! her glory gone,
And throne a wreck, where monarchs feigned to fall;
Her chiefs and army lost, her power undone!
Seized with despair she deigns not God to call,
In misery seeks a death her legions shun.

HENRY GEORGE HELLON.

A simple device for stretching carpets on the floor, patented by Mr. John B. Eddy, of Stevens Point, Wis., consists of a T-head, with claws for taking hold of the carpet, attached to a ratchet bar spliced to another bar carrying a lever, with which the first bar is moved out from the other, and a pawl or dog which engages the ratchet and retains the bar in the position into which it is moved by the lever.

A wash bench susceptible of being raised in height, and of being compactly folded, has been patented by Mr. Abram Severson, of Auburn, N.Y. It consists of a tripod, two of the legs whereof are fixed to the head and provided with casters, while the third is pivoted in the head, and can be folded around near the other two.

PRITCHETT'S PATENT ECONOMIC WARMING APPARATUS.

IT will readily be allowed by all who are familiar with the plans and processes which are now in general use for obtaining heat by means of the various hot water apparatus, that many as are their excellences they are open to various objections, both on the score of expense and also the space that is occupied by the hot water pipes and furnaces. The strength and durability that are deemed essential to both demand an outlay on pipes and furnace arrangements, &c., which necessarily involves large expense and considerable waste of heating power. The object of the inventor of the present apparatus has been to furnish that which may obviate these difficulties, and give a practical illustration of the fact that a large volume of air may be warmed with a very small expenditure of fuel. The apparatus consists of a series of receptacles, or cases, for water. The cases themselves may be formed of ordinary plates of corrugated metal, strongly put together, but having a small interval between them so as to unroll the water, as it were, into a film, and form a succession of reservoirs of water, about 30 inches in height, more or less, as is required, but only from ½ inch to one inch in thickness; enabling them, therefore, to be placed continuously, or as a series of panels, round any room or building intended to be warmed, and occupying scarcely any appreciable portion of the space of the room or building.

The corrugated form given to these reservoirs not only increases the area of the external surfaces, back and front, and imparts strength to the vessels, but secures a certain amount of friction in the action of the warmed water within the vessels which predisposes it to part with its heat during its circulation. The readiness with which that heat is so parted with is proved by experience, which shows that the sinuosities of the current of warm water, impinging upon the inside of the cases, greatly tend to the convection of its heat in the course of its circulation by radiation from off the corrugated surfaces from which it is emitted in all directions. Another marked peculiarity of the apparatus is observed when the water is warmed by the application of common gas; an ordinary burner, consuming about 5 feet of gas per hour, may be employed, but its whole power of producing heat is utilised by the admixture of atmospheric air with the gas before it is ignited, whereby the heating power of the gas jet is rendered as effective as would be that of several similar jets applied as open burners.

Another part of the plan in which the apparatus is formed embraces the admission of the external air through the centres of the receptacles or cases when formed into tubes, thereby securing the important result of keeping the breathing air of the apartment in a state fit for respiration, while it is maintained at a temperature sufficient for comfort. It need hardly be added how greatly this arrangement may be made to conduce to the comfort of invalids, or to the use of the apparatus in the sick wards of hospitals.

As an accompaniment of the above arrangement a plan is also employed technically called an "exhaust case," by which the air of the apartment already exhausted by use is removed in proportion as the fresh outer air is admitted. Thus far the use of gas jets, or any other ordinary mode of heating, has been pre-supposed for the warming the water in a small boiler which maintains the circulation of the small quantity of water which is employed, but should it be so preferred the apparatus can be brought into operation by means of an ordinary fire; in this case, a little reservoir, or kettle, will be supplied and fitted into a fire-place, or it may be even so arranged that a vessel connected with the flow and return pipes which maintain the circulation of the water, can be placed upon an open fire, and removed at will. The apparatus can be brought into use by being connected with the circulation from a kitchen boiler. By such means no extra fuel is required. But perhaps the most valuable feature of this invention consists in its adaptability to almost every situation in which gentle and continuous warmth is required. The little space that is occupied by the reservoirs, or cases, mere panellings of rooms; the ease with which the supply pipes can be laid from another chamber, so that no burner may be necessary in the room itself; the extreme simplicity of the apparatus, avoiding the cumbrous and heavy arrangements employed in hot water circulation of the ordinary kind tend to recommend the plans of this inventor as likely to be of much use where more pretentious plans are from any cause unavailable.

It cannot be doubted that there are many apartments in which the comfort of a genial warmth to be procured by the simple patent appliances mentioned will make them abodes of health and happiness, whose inmates may be very thankful for a plan which at a very moderate expenditure places such a blessing within their reach, and enables them to obtain a constant change of the air in their apartments without in the winter time lowering their temperature. Fires in rooms may even be dispensed with, thus greatly diminishing household cares and expenses. The Patentee, Mr. Pritchett, F.R.I.B.A., of Bishops-Stortford, Herts, will give all particulars on be applied to.

THE FUTURE OF THE ELECTRIC RAILWAY.

IT is now nearly forty years (says the *Scientific American*, from which we quote) since Professor Page's discoveries in electricity suggested to him the possibility of an electric railway; but in those days the costly galvanic battery was the only source of electricity available for such purposes, and his experimental electric locomotive was a practical failure. His power cost too much, and his machine laboured under the disadvantage of having to carry a considerable load of battery cells, the action of which was materially interfered with by the jarring and oscillation of the train when its speed approached three or four miles an hour.

The development of dynamo-electric machines during recent years has so lessened the cost of electricity as a motive power as to remove the most serious obstacle to the success of Professor Page's experiments. During the same time the transmission of powerful currents of cheaply generated electricity, through conductors of considerable length, and the reconversion of such currents into working force by economical motors, have become a matter of every day occurrence. It is quite natural and appropriate therefore that the problem of electrical propulsion should again come to the front, this time with every prospect of a speedy solution.

The problem had so long been in abeyance that when Dr. Siemens set up his electrical merry-go-round in Berlin last year, most men were disposed to look upon him as the propounder of a radically novel idea, and the electric railway as the product of the latest speculative thought in this direction. And when Mr. Edison adopted the system for practical use not a few people thought that he had switched off from the line of practical work to play with a novel toy, the outcome purely of his experiments in electric lighting.

The electric railway, however, is not a plaything. It is a practical reality, though just now entering upon the stage of useful and economical development. It opens a field of invention and improvement as wide and profitable probably as was opened up by the first steam locomotive: and we have no doubt that during the next fifty years it may work as great changes in the processes and economies of life as steam railways have during the half century just past.

On the little electric railway set up by Dr. Siemens in Berlin, the locomotive obtained its power from a special electric conductor running between the car rails, the current being returned through the rails. Mr. Edison has simplified matters by throwing out the central cable as a needless expense. He makes the track itself the conductor, sending the current up one rail and down the other, the locomotive being operated by the current forming a circuit through it when proper connections are made.

For readers unfamiliar with electrical motors it may be necessary to say that the power for the running of the electric locomotive is generated by a stationary boiler and engine, and transformed into electricity by an electric generator at the central station. As was suggested by the elderly lady fearful of boiler explosions, the water is boiled at home, and that source of danger is removed from the list of traveller's risks. And as the efficiency of a stationary engine is several times greater than that of a locomotive engine, it is possible to convert the power of a stationary engine into electricity, transmit it to the locomotive upon the track, and there reconvert it into working force as economically as (if not much more economically than) power can be directly evolved by the combustion of coal in a locomotive furnace.

In the present stage of his experimental apparatus, Mr. Edison claims that he can realise in his locomotive seventy per cent. of the power applied to the electrical generator. The track is spiked to ties, as in the construction of an ordinary railway, and the loss of electricity in transmission is not more than five per cent. even when the track is wet. If there is no error in these figures, and we see no reason to suspect them, the economy of the electric railway is established. Its apparent advantages over steam roads are numerous. In the first place, the locomotive is light, comparatively inexpensive, and does not require a fireman or a skilled engineer to run it. The lightness of the locomotive greatly relieves the track, which need not be nearly so strong and heavy for a given service. The wheels of the locomotive can be given any desired traction upon the rails, so that a light engine can pull a train up grades which are entirely impracticable with the ordinary locomotive. The track may therefore follow any ordinary road; and when the road is used purely for freighting, as in conveying ores from mines, the road may run where other roads would be quite impracticable.

For city use the electric railway promises to be exceptionally useful, both for the conveyance of passengers, and for carrying packages. Cars propelled and governed by electricity might supersede horse cars on the surface roads; and, even if no cheaper, the sanitary advantages of the electric road, resulting from the disuse of horses, would be considerable. Indeed, it is not impossible that the city of the future may dispense with horses entirely for general trucking as well as for passenger traffic, the roadways being laid with numerous lines of flat rails transmitting the power required for propelling carriages of every sort. The absence of noise, dust, friction, and the inevitable filth attending the use of horses, promises in the new dynamo-electric period a wonderful mitigation of the present evils of city life. On the elevated roads the lighter electric engines would be comparatively noiseless, and, unlike steam locomotives, would not be constantly pouring into the air sparks, cinders, and other offensive products of combustion; and the same power which propelled the cars would light them.

But, without attempting to forecast the distant future, it is easy to foresee abundant immediate applications of the new silent, wholesome, and economical method of transmitting and applying energy. The mining regions of the West, as well as our Eastern coal mines, present unlimited opportunities for its employment in hauling ores out of the mines along the mountain ravines and over their precipitous sides. The experiment of ploughing by electricity transmitted from a central generator was tried last year with encouraging success. The same plant would answer for the operation of cultivators and harvesters; and with a light, movable railway track, the same power would suffice to do the heavy hauling incident to farm work; and one of the great advantages of electric carriage would be shown here, as elsewhere, in the facility with which it can be operated from a distance. The wagon, loaded or empty, would need no driver, and could be trusted alone to pursue an even course between stations. By means of suspended cable-tracks the roughest regions could thus be safely and economically traversed either by small passenger cars, mail bags, or freight carriers; and the constant flow of evenly distributed small loads along such a line would aggregate as large a tonnage as is now transported over solid and costly roads in long but widely separated trains.

We have already experienced in the telegraph and the telephone the advantages of electricity as a carrier of thoughts and sounds. Who can tell but, when its capacities as a carrier of men and things have been fully developed, the electric telegraph and the telephone will be eclipsed in scope and utility by the electric road? Its possibilities are infinite; and it is the disposition of the men of these days to crowd the possible in every direction.

A NEW MOTOR.

ONE of the great wants of the day is a motor for small machinery, which shall avoid the danger and inconvenience of steam. This is accomplished in the Tom Thumb caloric engine, recently patented, which makes use of the expansive force of heated air alone. Its success is based on employing a comparatively low temperature—250° to 300° Fah.—producing a pressure of four to five pounds per square inch, and operating on a broad diaphragm piston of relatively short stroke. The piston is formed of two circular metallic discs, having between them a flexible diaphragm composed of a layer of vulcanised gum elastic sheet, and over this externally a layer of canvas, which protects the gum and prevents it from yielding to pressure. A clamp ring attaches this diaphragm air-tight to the rim of a dish-shaped vessel, so as to allow of a motion in the piston to the extent of about one-third its diameter. This is the working cylinder, from which, it may be observed, the boring and fitting, as well as friction incident to the ordinary arrangement, are quite eliminated. The piston box forms the upper member of the machine, the connection of piston and crank being apparent in the engine. The central part, the heater, is a tight metallic box, the interior heating surface of which is greatly increased by numerous thin plates or ribs cast in connection with the bottom and rising almost to the top nearly the whole length. The heat being applied to the bottom of the box, the lower edges of these ribs are virtually in the fire, and thus the whole are readily kept at a suitable temperature.

At the bottom is another piston box similar to the first, but larger, and having its piston below, with a valve in it opening inwards. This is the air pump, and it is connected with one end of the heater by a pipe which has an automatic valve at the lower end, opening upwards. As this piston descends it fills the box with air, which in ascending is forced into the heater, and the valve in the pipe prevents its return. The other end of the heater is connected with the upper piston box or motor by a pipe always open, the two thus forming one chamber.

The operation of the machine is thus:—The heater being filled with expanding air the motor piston is forced upward, and just before it reaches the highest point a tappet on one of the cross head guides raises a lever, pivoted on the outer frame, which lever in rising forces open a valve in the bottom of the motor box, opening a communication with the outer air, and consequently the pressure subsides, allowing the piston to descend. Soon after the main crank passes the top centre two long cranks on the ends of the shaft, connected with the cross-head of the lower piston by slotted rods, suddenly collapse the air-pump, blowing out the hot air from the heater and motor box through the now open valve in the bottom of the latter, and supplying its place with fresh cold air. The motor piston now descending presses and closes the latter valve, and the fresh air is confined between it and the valve below the heater, to be at once expanded for another stroke. The action of the air-pump not being against any pressure, little power is consumed in it. Like all other caloric engines it is single acting, and the pulley serves also for a fly-wheel. The internal capacities of the air-pump and heater are equal, and about three times that of the motor vessel. This is important in order to obtain sufficient pressure at a temperature so low as not to injure the motor diaphragm—the gum being vulcanised to bear about 300° Fah. The simplicity and cheapness of construction of this machine will recommend it for a great variety of purposes. An engine suitable to propel a sewing machine is about twenty-five inches high by thirteen wide, and heated by an oil or gas stove. An engine forty-five inches high is a quarter horse-power, while the full horse-power is six feet high by three feet wide.

For further information address J. Jenkins, No. 3, South Tenth-street, Philadelphia, Pa.—*Scientific American.*

EXTENSIVE FILTERING.

The Holyoke (Mass.) correspondent of the *Paper Trade Journal* says that a filtering experiment on a large scale is about to be tried by a company in that city, to obtain pure water for washing purposes in the manufacture of paper. Quite near the mills is a piece of land lying lower than the canal, and this the company proposes to fill with water to the extent of about three acres. Pipes will conduct the water from the canal bank into a bed of gravel some eight feet in thickness, through which it will pass, and it is expected that the filtering and the subsequent standing of the water in the reservoir will purify it sufficiently. The water will be about ten feet deep on an average, and will be pumped from a point about midway between the surface and the bottom. The experiment is a new one, and will be watched with interest.

An improvement in cannon has been patented by Messrs. Patrick B. Brannon and Thomas B. Bunting, of New York city. The invention relates to improvements in breech-loading cannon, and particularly to the construction of the breech, the breech block or wedge, and the manner of loading and firing the gun.

CANADIAN WEATHER.

Mr. H. G. Vennor, of Montreal, whose boldness in weather predictions has brought him into such prominence, says that the extreme cold of Canada is almost always produced by a wind blowing from a point to the north of west. Such a wind is both cold and dry. Being dry, in passing along it imbibes moisture rapidly, causing cold. Being also cold, it quickly absorbs heat from the surface of the earth; and when this continues for several hours of any day, and toward sunset it becomes calm, we then usually have the lowest state of the thermometer. In Canada, these extremes of cold usually last about three days; the nor'-wester beginning about noon of one day, blowing fiercely for that afternoon, becoming almost calm in the evening—then a cold night. Next day the wind is not so high, but still from a north-westerly point. Again, toward sunset, there is a calm, with the thermometer more or less below zero. In the morning, it may be observed that the force of the cold is breaking. If the wind veers round to a point south of west, there will be a few flurries of snow, very threatening in appearance, but amounting to very little in reality, no snow storms of consequence coming from the west. If, on the other hand, the wind passes to the east, several hours of bitter cold may be expected, followed by a general snow storm lasting from twenty to thirty hours.

VENNOR'S WEATHER PROPHECIES.

Mr. Henry G. Vennor comes forward again with his direful prophecies of storms, heat, cold, &c. His letter is dated at Montreal, May 18, and in it he says:—"I believe that June will be an intensely hot month, on the whole, but the end of the present month, and probably 'the first of June,' will be fall-like with frosts again. July will be a terrible month for storms, with terms of intense heat, but another fall like relapse, with frosts, will in all likelihood occur a few days before the 20th. I fear the storms of thunder and hail will be of unusual severity during July. I must claim the verification of my prediction relative to 'a cold wave with frosts, over a large portion of the United States between the 10th and 15th of May.' The relapse toward the close of the present month will be more severe than that just past."

RECENT AMERICAN AND FOREIGN PATENTS.

Veneers made of paper have been used in place of wood veneers to a limited extent. That they have not come into general use is due chiefly to the fact that the oil applied to their grained face prevents the due adhesion of the glue or cement by which they are attached to any wood surface to be ornamented. Mr. Isaiah M. Clark, of Coldwater, Mich., has patented a new, simple, and economical process, producing a paper veneer having an oil grained surface, and which will adhere to any object as firmly as wood veneers.

Mr. D. W. Clark, of Tidioute, Pa., has recently taken a patent for an improvement in window sashes, which all housekeepers will regard with satisfaction. It consists of a very simple arrangement of the sash, by which it may be quickly removed for cleaning, glass setting, or other purposes, and as quickly restored. A dwelling house furnished with these sashes has a positively increased value, for the glass work may be kept in handsome condition with much less labour than heretofore. This is an invention that is needed in almost every household. Considering that it is applicable to every window in every house, it will be seen that the uses of the invention, even in a small town, are quite extensive.

Mr. Allen Cox, of Boston, Mass., has patented a sheet metal pan, made without rivets, wire, or solder, and having its ring secured to it without the use of rivet or solder. It has edges as strong and as durable as the ordinary wire edged pan, is of somewhat less weight, is more convenient, as its broad, flat edges afford a good hold in putting it in or out of an oven. It can be manufactured at a greatly reduced cost of material, time, and labour.

An improvement in library lamp fixtures, patented by Mr. Joseph Kintz, of West Meriden, Conn., consists in a novel construction of clamping rings for holding the shade, and in the manner of fitting the stops that arrest the movement of the lamp in raising it.

Mr. Henry B. Winslow, of Marblehead, Mass., has patented an improvement in apparatus for the manufacture of lampblack. It consists in a certain novel construction, whereby the use of water is dispensed with and the character of the production improved.

A self-locking hook, so constructed that the weight of traces or other tension strain will hold the hooks locked to prevent them from becoming accidentally unhooked, has been patented by Mr. Joel R. Haines, Mount Laurel, N.J. The invention consists in forming upon the shank of the hook a toothed head, a toothed collar placed upon the rounded shank of the hook to engage with the toothed head, and a loop or half link attached to the toothed collar to receive the trace or other article and serve as a guard to prevent the hook from becoming accidentally unhooked.

An improved type clamp, patented by Mr. William J. Adams, of Philadelphia, Pa., consists of four tongued and grooved flat metal bands, each bent at a right angle, so that when fitted together they form an adjustable rectangular frame that may be extended or contracted as required to fit a form of types.

A binding for oil cloths, so constructed as to confine and protect the edge of the oilcloth while allowing the binding to be rolled into a coil, for convenience in handling, storage, transportation, and use has been patented by Mr. George S. Eaton, of Brooklyn, N.Y. The invention consists in a flexible metallic oil cloth binding, made with a thickened flanged edge to rest against the edge of the oil cloth, and at the same time allow the binding to be wound into a coil.

Messrs. Elias Leak, of Longton, and John Edwards, of Fenton, England, have patented an improved apparatus for supporting pottery ware in kilns and ovens. This invention relates to certain improvements in apparatus for supporting pottery ware in kilns and ovens while being baked, glazed, or otherwise fired, and has especial reference to the seggars in which the ware is placed and supported while in the kiln or oven.

Messrs. Amos A. Deuse and James Deuse, of Chester, Conn., have patented a die for forming double spiral grooves in bits or gimlets, consisting of the two halves having the longitudinal and slightly tapering grooves and diagonal cross-bars, one pair of the bars being smaller than the other.

A chop conveyer for millstones, patented by Messrs. James H Ellis, Alexander Scott, and Eli S. Edmondson, of Goderich, Ontario, Canada, consists in a spiral conveyer fitted to revolve in a channel around the bedstone and below the level of the grinding surfaces, which carries the chop to a discharge spout; also, in the construction and manner of operating the conveyer.

Mr. Edward Barnard, of Rome, N.Y., has patented a quarter boot for horses, having a soft leather body with stiff pads on the quarters, and a stiffening sole strip, the whole adapted to be held in place by straps and buckles.

An improved lamp burner, patented by Mr. Orlando Merrill, of Courtland, Ala., is so constructed that wider and narrower wicks, and larger and smaller chimneys, may be used with the same burners.

Mr. Joseph Kintz, of West Meriden, Conn., has patented an improvement in extension chandeliers, which relates to the means for retaining the extension rod of a chandelier in any position, as drawn out to lengthen the chandelier, and for releasing it, so that the spring may act to draw up the rod. The inventor makes use of a slide rod having its surface grooved or ribbed concentrically and sliding in a collar that is fitted with loose sectional nuts or clamping blocks, which are enclosed within a bevelled cup or ring. The cup is moved in one direction by a spring to force the nuts inward and clamp the slide rod, and is fitted for movement by hand to release the nuts by means of a trigger placed in a convenient position operating through a sliding tube that is connected to the cup.

Messrs. Lewis B. White and Leonard Henderson, of Middleburg, N.C., have patented a smoke and dust arrester for railway cars, which consists in enclosing the trucks of the cars in a housing having doors at the ends, which housings communicate with a pipe extending through the entire train, through which the air and dust from the wheels is drawn by a fan located in the rear car. Smoke may be drawn from a hood located above the smoke stack of the locomotive by the same pipe.

An improved device for fastening an umbrella to the body of a person who is exposed to the rays of the sun during his work, has been patented by Mr. Thomas Mora, of Franklin, La. The invention consists of a tubular socket provided with side springs, and of a tube provided with a laterally projecting ring, both of which are buttoned or otherwise fastened to straps or bands that buckle about the body.

Mr. Hubert Child, of Wichita, Kan, has invented improvements in transparent signs. It consists in "cutting in" a transparent letter on glass by means of an opaque colour, and placing behind the glass a packing of broken glass contained between two independent panes of glass, so that when the light from the rear shines through the transparent letter the plane character of said letter is broken up and diversified by the crystals of glass, which may be of different colours to produce a very brilliant and tasteful design.

An improvement in gate latches, patented by Mr. Samuel B. Elzey, of Atlanta, Ga., consists in combining a pivoted latch carrying an arm, a sliding bar carrying an arm, and a spindle carrying an arm, so that the gate may be unlatched by turning the spindle.

Mr. William Lineham, of Chicago, Ill., has patented a device for automatically feeding the fluid for preventing incrustation into the boiler along with the feed water, when supplied by a pump or an injector. It consists of a reservoir for holding the fluid, from the bottom of which a siphon pipe leads to the pump barrel or injector at a point where the water is forced or drawn by suction into the boiler. The siphon pipe is supplied with a stopcock and check valve, to regulate the amount supplied and to prevent back pressure when pumping.

Mr. Joseph Kintz, of West Meriden, Conn., has patented an improved process for giving an ornamental surface or finish to iron castings, which process is as follows:—The casting is first rolled or tumbled in the usual manner, and polished on the portions of the surface that are to have a polish on the finished article, and then the casting is coated with copper or other metal by electroplating. It is next subjected to acid bath, for cleaning, and then buffed to render the surface smooth and bright. It is then boiled in a tin or other metallic solution. The solution will deposit evenly over the entire surface, and the polished portions will be left brilliant, thereby forming a fine contrast with the unpolished surface and giving a fine polish and effect. The polishing previous to the electroplating, and the buffing subsequent thereto, are essential steps in the process, and by the boiling in a metallic solution the desired colour and a bright clean finish are obtained without further labour.

A simple, convenient, and effective device for stretching wires along posts in the making wire fences, has been patented by Mr. Joshua Fowle, of Iowa City, Iowa. The invention consists of a clamp provided with devices for adjusting and holding it upon a post, and provided also with crank and crank-shaft for stretching and tightening the wire.

An improvement in the class of automatic car couplings in which a bar is employed as the connecting device in place of the link, and is made to engage with spring jaws or catches located within the draw heads, such jaws or catches being operated by levers and connecting rods for the purpose of withdrawing them from engagement with the bar when it is desired to uncouple, has been patented by Mr. James H. Henley, of Leadville, Col.

An improvement in the class of invalid beds having adaptation and attachments for elevation of the head and shoulder portion and for introduction of a bed pan beneath a removable section of the mattress, has been patented by Mr. Chambers M. Campbell, of Nashville, O.

A simple, durable, and easily actuated alarm attachment for doors has been patented by Mr. Charles F. West, of Philadelphia, Pa. The invention consists of a peculiar arrangement of lever, striker, and trigger that render the alarm especially durable and of easy operation.

A safety appliance for releasing horses has been patented by Mr. Benjamin F. Strange, of Corvallis, Montana Ter. This invention consists in a hitching appliance so connected with the horse's halter that the halter will be cut if the animal should become entangled in it.

Mr. Mortimer Shea, of Nashville, Tenn., has patented an improved device for attachment to gas meters, to guard against any adjustment of the meter that will cause gas to pass through without being registered, and to indicate to the inspector if there has been any attempt to tamper with the meter.

An improvement in window sashes, patented by Mr. Alphonse Friedrick, of Brooklyn, N.Y., relates to lead sashes, such as are used in illuminated or ornamental windows. As heretofore constructed such windows have been strengthened by iron rods placed at intervals diagonally across the lead frames, and secured thereto by small wires twisted round the bars and soldered to the lead cross strips. Such bars are unsightly. They disfigure the designs, and in large windows the lead sash between the bars is not protected. The object of this invention is to strengthen the lead sashes where required by metal wires, which will be soldered to and hid by the sash.

Mr. Orlo H. Drinkwater, of Cedar Point, Kan., has invented a car-coupling which consists mainly of a draw-bar having a hook or shoulder and a link or clasp, which is pivoted and adapted to receive and lock with the shoulder or hook of a draw-bar attached to the opposite car. The links or hinged clasps are held engaged with the respective draw-bars by means of a spring or other suitable devices, and may be opened to allow uncoupling by means of rods, levers, or other means. The hinged loop or clasp is held open by a spring catch until the latter is acted on automatically, thus causing it to release the clasp.

Mr. Max Rubin, of New York city, has patented a bottle stopper provided with a discharge spout, and so constructed that the spout may be covered and uncovered by closing and opening the stoppers.

An improved store counter has recently been patented by Mr. Henry H. Henderson, of New Glasgow, Nova Scotia. The invention relates to means for supporting the hinged covers of the sections; and it consists in two jointed bars or rods, one pivoted on the inside and the other provided with an eye that slides on a keeper attached to the under side of the cover, in combination with a notched cam on the inside of one end of the section, so that the pivoted rod catches behind the shoulder when the cover is opened and holds it firmly in position.

Mr. John D. Richardson, jun., of Newport, R.I., has patented an improved electric call bell. The object of the invention is to permit the operation from the central station of any one bell in the circuit, whereby one station may be called without giving an alarm at any of the others.

An improved signalling apparatus for railroads has been patented by Messrs. Richard B. Ireland, of Trenton, and William H. McDonald, of Newark, N.J. The object of this invention is to provide for operating a signal located at one point on a railroad from different places—say from two separate switches—in such manner that the signal shall be exhibited when either switch is open and until both are closed, or so long as the main line is not clear.

Mr. Hiram N. Wickes, of Grand Gorge, N.Y., has invented an improved car coupling that couples automatically without requiring any one to step in between the cars, the link being held in horizontal position, so as to secure its entrance into the opposite drawhead. The invention consists of a drawhead, with internal cavity having upwardly inclined rear portion and central guide rib, along which a centrally grooved roller is carried by the link.

Mr. Albert Bonzon, of Santiago, Cuba, has patented a new attachment for the second-hand shaft of clock or watch works which will cause the second-hand to beat seconds, and which is so arranged that these beatings of the second-hand can be interrupted or started at any desired moment.

Mr. William B. Garoutte, of Republic, Mo., has invented a novel cotton and seed planting machine. This improvement relates to machines for forming a mould or ridge, dropping the seed along the ridge, and covering the seed.

Mr. William L. Dietz, of Schoharie, N.Y., has patented an improvement in scrapers and cultivators for broom corn, cotton, and other plants planted in rows and drills, so constructed that they may be readily guided to operate upon crooked rows, and may be conveniently turned at the ends of the rows.

Mr. Joshua W. Jones, of Harrisburg, Pa., has patented improved attachments for hydraulic presses, so constructed as to close the outlet valve automatically when the follower has been run back to a fixed point, and to sound an alarm when the desired pressure has been attained.

An improved harness pipe loop attachment for wax thread sewing machines, has been patented by Mr. David M. Lewis, of Memphis, Tenn. The sewing of pipe loops by hand is slow and tedious work, and greatly increases the cost of the harness; but with this attachment it is said that such work will cost less and be stronger. It can be used on lower grades of harness, and will improve their looks and increase their market value.

An apparatus for illustrating the rules of perspective drawing, so that a teacher by its use can prove to his pupils the correctness of the diagrams made in accordance with the rules, has been patented by Mr. Frank O'Ryan, of New York city.

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SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

President, SIR ANTONIO BRADY.

THE SESSION 1879—1880
IS ENDED.

The Balance Sheet 1879-80 can now be inspected.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. CAMPIN, Sec.

Proceedings of the Institute.

MEMBERS' MEETING.

ON Thursday, 3rd June, Mr. A. J. Murray, Member of the Council of the Institute, in the Chair, Mr. G. E. Pritchett read his paper on "Important Improvements in Barometers and Thermometers," which he illustrated by reference to several models. The matter was fully discussed by gentlemen present, the chairman, Mr. Baker (from the eminent opticians Messrs. Steward), Mr. Engert, Mr. Greenfield, and others, expressing themselves in favourable terms. The Secretary, Mr. F. W. Campin, proposed a vote of thanks to Mr. Pritchett, which, being seconded by Mr. Greenfield, was carried unanimously; and with the usual complimentary acknowledgments to the chairman the proceedings terminated.

EXECUTIVE COUNCIL.

On the 3rd June, after passing the minutes, and transacting some financial business, the Secretary reported that he had up to that time heard nothing further of Mr. Anderson's Patent Bill, but stated he would watch for it, and note its progress, and he was requested so to do.

[The Bill has since come to hand, and will be found set forth in detail in another column.]

Monthly Notices.

A German historico-economic work on the commercial policy of England during the sixteenth century, by Dr. Georg Schanz, Professor of Political economy at Erlangen, is in the press, and will be published next autumn. Dr. Schanz has investigated sources of information hitherto unexplored, and his work is looked for with much interest by German economists.

Prof. D. T. Ansted, whose death was announced as having taken place on the 13th of May, was born in London on the 5th of February, 1814; entered at St. John's College, Cambridge, in 1832. In 1836 he passed as thirty-second wrangler, and took his B.A. degree. Under Prof. Sedgwick he studied geology, and in 1838 he was elected F.G.S. In 1840 Mr. Ansted succeeded Prof. Phillips in the chair of Geology in King's College, and was elected an F.R.S. From 1846 Prof. Ansted devoted himself to the economic applications of geology, which he continued until his death.

Sir Henry Bessemer has been accorded the freedom of the City of London in a gold casket, in recognition of his valuable discoveries.

The Rev. J. M. Mello has in the *Transactions* of the Manchester Geological Society, Part III. Vol. XV., some interesting "Notes on the more Recent Discoveries in the Cresswell Caves." No fewer than nineteen species of mammalia have been discovered in them, and two human skulls.

Tables of Spirit Gravities, of an elaborate character, have been prepared by Dr. Stevenson, of Guy's, specially adapted for the use of those engaged in the analysis of alcoholic liquids, to be published in book form by Mr. Van Voorst.

An Electrical Indicator, which shows the exact speed of an engine placed at a distance, has been devised by Mr. H. B. Kempe, of the Telegraph Department. The arrangements are most simple and effective.

M. Mouchot's Heat Receiver.—Before the Académie des Sciences, on May 24th, M. Mouchot brought a notice of his inquiries into the "Industrial Utilisation of Solar Heat." He has been making his experiments at Algiers, and has improved his heat receiver, and since March a horizontal engine, without expansion or condensation; and has been actuated by the solar heat at the rate of 120 revolutions a minute, with a constant pressure of 3·5 atmospheres, the disposable work being about 8 kilogrammes, with which he has actuated a pump.

The Earl of Worcester, of inventive memory, according to documents recently published in the State Papers, petitioned in February, 1654, for the Commonwealth under which he was imprisoned for his loyalty to the Crown, leave to come with his keeper to York House, Strand, alleging that his presence was necessary for a trial of his invention "to raise water in a 7-inch bore pipe by the strength of one man, for which people have hitherto used horses at vast expense." He was allowed to proceed under guard to York House, but after testing the invention he returned to his captivity.

Nickel in a Malleable Form has been produced by Dr. Fleitmaun, who has perfected a process of production. M. Troost has communicated a paper to the Société d'Encouragement pour l'Industrie Nationale on this subject. It has hitherto been impossible to obtain large pieces of nickel which can be rolled. The Fleitmaun process appears to have overcome this difficulty. A plate of nickel a tenth of an inch in thickness can now be welded to an iron plate by bringing both to a red heat, and then passing the compound sheet through rollers or bringing it under a hammer; the nickel covering may be reduced to only 1-2000th inch in thickness.—*Athenæum.*

Society of Arts.—The Council of this Society have awarded medals to the following gentlemen for papers read during the session which is just over:—Major-General H. Y. D. Scott, C.B., F.R.S., A. J. Ellis, F.R.S., John Spark, Henry B. Wheatley, F.S.A., W. Holman Hunt, Thomas Fletcher, F.C.S., John C. Morton, Prof. Heuton, F.C.S., Captain Abney, R.E., F.R.S.

It seems likely that Comet *b*, 1880 (discovered April 6th), will become visible again after its perihelion passage in July. On the 8th of May Major Tupman, at Blackheath, observed it pass almost centrally over a catalogued star of the eighth magnitude.

The Scientific Review

AND

SCIENTIFIC AND LITERARY REVIEW,

A RECORD OF PROGRESS IN

ARTS, INDUSTRY, AND MANUFACTURES.

INCORPORATING THE

JOURNAL OF THE INVENTORS' INSTITUTE.

JULY, 1880.

THE NEW PATENT LAW AMENDMENT BILL.

Last month we gave utterance to some very stringent remarks on the impolicy and impropriety of the Government allowing our notoriously bad patent laws to remain unreformed, and we alluded to Mr. Anderson's Bill, which is now endorsed, not only by that gentleman, but by Mr. Alexander Brown, Mr. Hinde Palmer, and Mr. Broadhurst.

We are afraid there is no chance of the Bill passing this Session : but as it proposes to effect a very important step in the right direction we now present it to the notice of our readers:—

1. The Act to come into operation on the first day of January one thousand eight hundred and eighty one.

2. Her Majesty may from time to time, by warrant under her sign manual, on the recommendation of the Lord Chancellor, appoint an officer to be called the Chief Commissioner of Patents for Inventions, and on the recommendation of the President of the Board of Trade two officers to be called respectively Second and Third Commissioners of Patents for Inventions; and these officers shall hold their offices during Her Majesty's pleasure.

3. The Treasury may fix the salary for these three Commissioners at such annual sums as it deems proper, but not exceeding, for the First Commissioner £1,500, Second Commissioner £1,200, and Third Commissioner £1,000; and the Treasury may also provide further moderately paid assistance as may be found necessary for carrying on the work of the office, but as far as possible continuing those now employed. All payments under this section to be out of moneys to be provided by Parliament.

4. It shall be the function of these three paid Commissioners to do all the duty hitherto performed by the unpaid Commissioners and the Law Officers, whose duties shall thereupon cease; to take over the establishment from them; and to manage all the business of the Patents for Inventions Office of the United Kingdom, and to perfect its organisation; more particularly in the matter of a library of records and registers, so indexed and arranged as to facilitate searches, and to be easily accessible to the public under such reasonable regulations and small fees as the Chief Commissioner with approval of the Lord Chancellor may from time to time prescribe.

5. Letters Patent for Inventions shall be granted for the period of twenty-one years from the date of application, subject to a payment at the end of the seventh, and at the end of the twelfth, and at the end of the seventeenth years respectively, as prescribed in the schedules appended to this Act; and the provisions of this section shall apply also and equally to inventions (including foreign inventions) that may have been previously patented abroad.

6. Letters Patent for Inventions granted prior to the commencement of this Act, and then in force, shall be exempted from the payments formerly prescribed at the end of the third year, and at the end of the seventh year, so far as these payments have not become due at the commencement of this Act, and shall thereafter be liable only to the payments prescribed in the schedules appended to this Act, and at the end of the twelfth year may be extended to twenty-one years, subject to payment of the sums prescribed in said schedules.

7. After a patent shall have been sealed, the failure to pay the stipulated duty at any of the subsequent terms when due shall not invalidate the patent, provided at some period before the expiry of twelve calendar months after such due date the duty shall have been paid, together with such amount of fine as is specified in the appended schedule of fines for postponed payments, but failing that the patent becomes void.

8. There shall be paid to and for the use of the Crown on the several instruments described in the appended schedules the duties and fines mentioned in those schedules, and no others.

9. The term for provisional protection shall henceforth be extended to twelve months, and the patent, when sealed, shall date as of the day on which the petition for letters patent was left at the office of patents for inventions by the applicant.

10. At any time subsequent to the sealing of a patent it shall be in the power of its owner to add to it such improvements as he may desire, unless the Chief Commissioner shall decide that the improvement proposed is not a legitimate addition to the patent, but is more properly the subject for a new patent. For every such addition to a patent, or procedure connected with such addition, there shall be paid one-half of the initial stamp duties, and subsequently one-half of each stamp duty still remaining to be paid, as these may fall due on the original patent, or with proportionate fines for postponed payment. Any such addition to a patent shall expire along with the original patent.

11. A patent shall have to all intents the like effect as against Her Majesty the Queen, her heirs and successors, as it has as against a subject, but the Secretary of State of any Department may, with consent of the Treasury, use for the public service any patented article, or any patented manufacturing process, on such terms as may be agreed on with the owner of the patent, or failing such agreement, the Treasury and the owner shall each appoint an arbitrator, and the arbitrators shall appoint an umpire in event of disagreement, and the terms so arrived at shall be binding on both parties.

12. Employment in the public service shall not preclude any person from taking out or owning a patent or from any participation in the privileges of a patentee, but this provision shall not apply to any person employed in the Office of Patents for Inventions.

Schedule of Stamp Duties.—On petition for grant of Letters Patent, 10s. Notice to proceed, 10s. Warrant, £1. Sealing of Letters Patent, £1. Specification, £1. At the end of seven years, £20. At the end of twelve years, £40. At the end of seventeen years, £40. Notice of objections, £1. On certificate of every search and inspection, 1s. On certificate of entry of assignment or license, 5s. On certificate of assignment or license, 5s. Application for disclaimer, £1. Caveat against disclaimer, £1. On every addition to a patent one-half of the above stamp duties.

Schedule of Fines for Postponed Payments.—If paid within three months after due date, 25 per cent. on the duty then due. If paid within second three months' 50 per cent. If paid within third three months' 75 per cent. If paid within fourth three months' 100 per cent. On every addition to a Patent, one-half of the above fines.

Proceedings of Societies.

ROYAL SOCIETY.

April 29.—The Treasurer in the chair.—The following papers were read, "Note on the Spectrum of Carbon," by Mr. N. J. Lockyer; on "The Diurnal Variation in the Amount of Carbon-Dioxide in the Air," by Prof. G. F. Armstrong; "Measurement of the Actinism of the Sun's Rays and of Daylight," Preliminary Notice, by Dr. A. Smith; on "Some Elementary Principles in Animal Mechanics, No. X. (concluding the Series), further illustrations of the 'Law of Fatigue,'" by Rev. Professor Haughton; and on "The Absence of Potassium in Protagon prepared by Dr. Gamgee," by Prof. Roscoe.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

April 7.—Mr. H. S. Cuming in the chair—Mr. Irvine reported the discovery of a large number of fourteenth century tiles during the restorations now in progress at Bangor Cathedral. Many of these are of great beauty.—Mrs. M. Hyde exhibited a large number of early newspapers, showing in a remarkable manner the rapid progress of journalism.—The discovery of a Roman villa near Brading, Isle of Wight, was announced by Mr. J. Henry. The site is on Morton's Farm, and already a tesselated pavement and several continuous walls have been excavated.—Mr. R. Blair described a small Roman altar which has been found at the Lawes, South Shields, the site of the recently discovered Roman station.—Mr. L. Brock exhibited a large number of fragments of Roman fictile vessels found in London, and remarkable for their indicating various classes of pottery made by that people. One of these had a potter's mark in cursive characters, which were at first taken for Hebrew.—Mr. C. Warne exhibited some Etruscan objects of great interest, one being the attenuated figure of a warrior, and intended to represent his departed state.—Various other objects were exhibited by the members, and among these were two pewter measures by the Rev. S. M. Mayhew, one being inscribed, "Timothy Buck at ye Fountain in Portugall Street against ye Playhouse," and the other with the name of "R. Yeo at ye Blew Lattice in Ship Yard within Temple Bar." Many interesting records of the old playhouse were noted, and Mr. Lambert called attention to the marks on early pewter work.—The first paper was by the chairman, who traced the history of ladies' work-bags, and indicated the amount of interest and information that might be obtained from these articles, which were now in less use than formerly.—The lecturer illustrated his remarks by the exhibition of several examples of English and foreign work; one, of seventeenth century date, was elaborately worked in crewels.—The second paper was by the Rev. Prebendary Scarth, on a series of sepulchral inscriptions brought from Italy, and now at Rookwood House, near Llandaff. The importance of making collections of inscriptions in private possession was dwelt upon.—In conclusion, Mr. Lambert referred to the impending removal of the old buildings opposite Lambeth Church.

ZOOLOGICAL SOCIETY.

April 6.—Prof. W. H. Flower, President, in the chair.—The Secretary read extracts from letters which he had received from Mr. W. A. Conklin, of New York, relating to the birth of an elephant which had lately taken place in a travelling menagerie at Philadelphia.—Papers and communications were read, by Prof. T. H. Huxley, on "The Distinctive Characters of the Species of the Genus Canis, as shown in certain points of the structure of their skulls and in the proportions of their teeth;" by Dr. F. Day, on "The Fishes of Afghanistan," based principally upon a collection which had been made for him in the highlands of Kelat and Quettah by Dr. Duke; and from Prof. J. von Haast, on a specimen of a rare Ziphioid whale (*Epiodon Novæ-Zealandiæ*), which had been cast ashore at New Brighton, New Zealand, in July, 1878.

May 4.—Prof. W. H. Flower, President, in the chair.—The Secretary read a report on the additions made to the Society's Menagerie during April, and called special attention to an example of the short-nosed Perameles (*Perameles obesula*), purchased April 15th, being the first example of this marsupial which had been received: to a young male Cape hunting dog (*Lycaon pictus*); and to a Koala, or native bear of Australia (*Phascolarctus cinereus*), purchased April 28th, the first example of this marsupial that had been brought alive to Europe.—Mr. Sclater exhibited a specimen of the ibis (*Geronticus comatus*) late obtained at Biledjik, on the Euphrates, by Mr. Danford, and made some remarks on its previously known distribution.—Letters and communications were read by Dr. A. Gunther, on the statement made by him, at the meeting on 20th of January last, respecting the occurrence of *Holocanthus tricolor* on the British coast: further particulars received led him to decide that this fish could not be considered as having been caught on the British coast; by Mr. W. A. Forbes, on the cause of death of a leopard in the Society's Menagerie; by Mr. Dobson, on some bones of the dodo, transmitted from Mauritius in 1847-50; by Prof. Flower, on the fact that a young specimen of the lesser fin whale (*Balæonoptera rostrata*), fifteen feet long, which had been taken off the coast of Cornwall, was now being exhibited in London; from Prof. J. O. Westwood, an account of the species of saw-flies comprising the Australian genus Perga of Leach; from Dr. W. J. Hoffman, on a supposed instance of hybridisation between a cat and a lynx; by Mr. W. A. Forbes, the second and third parts of his series of papers on the anatomy of Passerine birds; from Mr. F. Day, on a new Entomostracon from Afghanistan; by Mr. O. Thomas, on a collection of mammals brought from Ecuador by Mr. Clarence Buckley: among these was a new species of Bassaricyon, proposed to be called *B. Alleni*; by Mr. A. G. Butler, on a collection of Lepidoptera made by Major H. Roberts at Rokeran, near Kandahar, on the river Urgundab; by Mr. G. F. Angas, on the marine molluscan Fauna of South Australia, with descriptions of six new species, and on three species of marine shells from Port Darwin, Torres Straits, discovered by Mr. W. J. Bednall, and on a new Helix from Kangaroo Island, South Australia; and Mr. F. J. Bell exhibited the immature specimen of Echinolampas referred to by him in his communication on Palæolampas, pointing out its more differentiated characters, and suggesting the possibility of its being an example of *E. Oviformis*.

INSTITUTION OF CIVIL ENGINEERS.

April 13.—Mr. W. H. Barlow, President, in the chair.—The following papers were read, on "The Abingdon Sewerage," by Mr. C. F. Gower; and on "The Main Drainage of Torquay," by Mr. G. Chatterton.—M. de Lesseps was proposed by the Council for election as an Honorary Member.

May 4.—Mr. W. H. Barlow, President, in the chair.—At the monthly ballot Count F. de Lesseps was elected an Honorary Member; Messrs. H. J. Pauling, C. Pihl, and G. Seaton were elected Members; and Messrs. J. B. Abbey, E. S. Barlow, J. G. H. Clow, W. P. Costobadie, J. Craig, J. G. Griffin, M. W. Hervey, E. Hesketh, P. H. Holmes, F. Hudson, H. D. Johnston, J. Lyons, J. C. Mackay, T. Michell, M. J. Monckton, R. O. Paterson, J. C. Peache, G. Purcell, F. Sharp, J. D. Thomas, L. G. Tyrrell, E. F. Welch, and R. S. Wyld, jun., Associate Members.

May 11.—Mr. W. H. Barlow, President, in the chair.—The following papers were read on "The Manufacture and Testing of Portland Cement," by Major-General H. Y. D. Scott and Mr. G. R. Redgrave; on "Portland Cement Concrete and some of its Applications," by Mr. E. A. Bernays; and on "Portland Cement: its Nature, Tests, and Uses," by Mr. J. Grant.

SOCIETY OF ARTS.

April 8.—A paper on "Recent Improvements in Benzine Colours" was read before the Applied Chemistry and Physics Section by Mr. F. J. Friswell.

April 12.—Mr. R. W. Edis delivered the second lecture of his course on "The Decoration and Furniture of Town Houses."

April 14.—G. Bullen, Esq., in the chair.—Three candidates were proposed for election.—A paper on "The History and Art of Bookbinding" was read by Mr. H. B. Wheatley.

April 16.—Sir T. Douglas Forsyth in the chair.—Prof. A. Vambéry, who had come over to this country at the invitation of the Council, read a paper on "Russia's Influence over the Inhabitants of Central Asia during the last Ten Years" before a meeting of the Indian Section of the Society.—A discussion followed, in which Sir E. Perry, Sir R. Alcock, and others took part.

April 19.—R. B. Carter, Esq., in the chair.—The third lecture of his course on "The Decoration and Furniture of Town Houses" was delivered by Mr. R. W. Edis. The lecture was directed to a comparison of ancient and modern furniture, and to the methods adopted in the construction of furniture generally.

April 21.—Sir Coutts Lindsay in the chair.—Fourteen candidates were proposed for election as Members.—A paper on "The Present System of obtaining Materials in use by Artist Painters as compared with that of the Old Masters" was read by Mr. W. Holman Hunt.

May 3.—Mr. R. W. Edis gave the fifth lecture of his course of Cantor Lectures on "The Decoration and Furnishing of Town Houses." The colouring, decoration, and general treatment of the drawing-room, boudoir, bed-room, and offices formed the principal subject of this lecture.

May 5.—J. Caird, Esq., in the chair.—Thirteen candidates were proposed for election as Members.—A paper, entitled "Agricultural Experience: the Lesson of Forty Years," was read by Mr. J. C. Morton.

May 6.—Lord A. S. Churchill in the chair.—A lecture on "Fleuss's Diving Apparatus" was delivered by Dr. B. W. Richardson. The various parts of the apparatus were exhibited, and demonstrations of its use given by Mr. Fleuss.

May 7.—Sir W. R. Robinson in the chair.—A paper on "The Present Condition and Prospects of Agriculture in Southern India" was read before the Indian Section of the Society by Mr. W. Robertson.

May 10.—R. B. Carter, Esq., in the chair.—Mr. R. W. Edis delivered the concluding lecture of his course of Cantor Lectures on "The Decoration and Furnishing of Town Houses," dealing principally with the various fittings and articles of domestic use, and the means by which they may be applied to the general scheme of decoration.

May 12.—Five candidates were proposed for election as members.—A paper on "The Utilization of Blast Furnace Slag for Building and other Purposes" was read by Mr. C. Wood.

MATHEMATICAL SOCIETY.

April 8.—C. W. Merrifield, Esq., President, in the chair.—Mr. J. Barnard was elected a member, and Mr. T. O. Harding admitted into the Society.—The following communications were made, "A (presumed) New Form of the Equations determining the Foci and Directrices of a Conic whose Equation in Cartesian Co-ordinates is given," by Prof. Wolstenholme; "The Application of Elliptic Co-ordinates and Lagrange's Equations of Motion to Euler's Problem of Two Centres of Force," by Prof. Greenhill; "Theorems in the Calculus of Operations," by Mr. J. J. Walker; on "The Equilibrium of Cords and Beams in Certain Cases," by Mr. W. J. C. Sharp; on "Steady Motion and Vortex Motion in an Incompressible Viscous Fluid," by Mr. T. Craig; and on "Functions analogous to Laplace's Functions," by Mr. E. J. Routh.

PHYSICAL SOCIETY.

April 10.—Prof. Fuller in the chair.—Mr. W. O. Smith and Prof. Judd were elected members.—A paper by Mr. W. Ackroyd, on "The Human Eye as an Automatic Photometer," was read.—Prof. Ayrton explained the experimental fact in frictional electricity exhibited at the last meeting on the ground that one of the substances, glass, was an electrolyte.—Dr. Stone described a new tonometer, devised by Prof. R. König, on the combined principle of a clock regulated by a tuning fork and Helmholtz's vibration microscope.—Dr. Guthrie exhibited a collodion and cats' fur electric machine giving negative sparks. He also showed that an iron cylinder revolving round its longer axis, with a current of electricity flowing in a wire parallel to the axis, had power to deflect a magnetic needle; and Prof. Ayrton stated that by experiments of his and Prof. Perry's he found that the cylinder alone possesses this power, and therefore thought the current was perhaps unnecessary to produce the effect exhibited by Prof. Guthrie.

May 8.—Prof. Sir W. Thomson in the chair.—Dr. E. Obach, Messrs. E. F. Bamber, R. D. Turner, E. Woods, H. E. Roscoe, and H. Watts were elected members.—Prof. Minchin continued the account of his researches given at the last meeting, and showed that the fall of light on fluorescent bodies gave rise to electricity.—Dr. O. J. Lodge described improvements made in his new electrometer key for delicate researches, increasing its efficiency and convenience. He also described an inductometer, or modification of Prof. Hughes's induction balance, enabling electric resistances and capacities to be measured.—Prof. Adams then took the chair, and Sir W. Thomson described his new water steam pressure thermometers for the accurate measurement of low temperatures and ordinary temperatures, based on the relations of the temperature and pressure of water steam. Sulphurous acid vapour and mercury vapour are also to be employed by him in thermometers.

GEOLOGICAL SOCIETY.

April 14.—R. Etheridge, Esq., President, in the chair.—Messrs. C. Brown, J. N. Dufty, and G. B. Nichols were elected Fellows.—The following communications were read, on "A new Theriodont Reptile (*Cliorhizodon Orenburgensis*, Twelvetr.) from the Upper Permian Sandstone of Kargalinsk, near Orenburg, in South-Eastern Russia," by Mr. W. H. Twelvetrees; and on "The Classification of the Tertiary Period by means of the Mammalia," by Prof. W. B. Dawkins.

April 28.—R. Etheridge, Esq., President, in the chair.—Rev. J. O. Bevan, Messrs. A. Hague, A. C. Maybury, H. P. Meaden, W. P. Propert, and F. Randell were elected Fellows.—The following communications were read, "Description of Parts of the Skeleton of an Anomodont Reptile (*Platypodosaurus robustus*, Ow.), from the Trias of Graaff Rainet, South Africa," by Prof. Owen; "Note on the Occurrence of a new Species of Iguanodon in the Kimmeride Clay at Cumnor Hurst, Three Miles west of Oxford," by Prof. J. Prestwich; and on "*Iguanodon Prestwichii*, a new Species from the Kimmeridge Clay," by Mr. J. W. Hulke.

ASIATIC SOCIETY.

April 19.—Sir H. C. Rawlinson, K.C.B., President, in the chair.—La Comtesse de Noailles, Col. Keatinge, Mr. G. H. M. Ricketts, and Mr. J. P. Harrison were elected Resident Members.—Prof. Vámbéry read a paper on "The 'Uzbeg Epos,'" a work comprehending many points of interest, historical, geographical, and ethnological, in which he pointed out that the manuscript containing these poems was wholly different from the small treatise edited some years since by M. Berezin, in that it contains seventy-nine cantos and eight thousand lines. The subject of it is the wars of Sheibani Khan, the famous conqueror of Central Asia and rival of Bâber, which are reported in a most full—indeed, often tedious—prolixity. Considered as a poem, it is inferior to some other similar Oriental compositions, but it gives a most valuable account of many events we knew of previously only through the medium of partial Persian writers, or from the memoirs of Bâber. It gives at the same time many and various interesting details of the ethnology and ethnography of Central Asia, so that we thus gain a clear insight into the ethnical and social life of that portion of the globe at the beginning of the sixteenth century. The author of the epic was Muhammad Khan, a prince of Khiva, Court poet to, and one of the generals of, Sheibani. He is believed to have met a premature death on the battle-field.—After the paper had been read there was a discussion, in which the President, Col. Yule, Mr. Redhouse, and Mr. H. H. Howorth took part.

May 10.—Sir T. E. Colebrook, Bart., M.P., in the chair.—His Excellency the Chinese Ambassador was elected an Honorary Foreign Member.—Mr. H. B. Low was elected a Resident, and Messrs. J. S. Bond, W. F. Hooper, C. E. Pitman, and Mahendra Lal Sircar, Non-Resident Members.—M. Terrien de la Couperie read a paper "Sur l'Histoire de la Langue Chinoise et de quelques Noms Geographiques de l'Empire du Milieu," in which he pointed out the great value for the history of a large portion of the world of a Chinese work called the "Yh Sing," which had hitherto been altogether misunderstood. A great part—more than half—of this work consists of lists resembling the syllabaries which have been recently made known to us from the cuneiform inscriptions. To show this the writer gave a complete translation of one chapter, and showed the identity of the lists in it with the cuneiform syllabaries, his conclusion being that the most ancient Chinese was a member of the Amardian branch of the Uralo-Altaic agglutinative languages, thus forming a connection between the dialects of Susiana and the Ugro-Finnish. He then gave a history of the writing itself and of the hieroglyphic revival of the ninth century B.C., which followed a form exhibiting the characteristics of cuneiform writing. His general conclusion was that about twenty-five centuries B.C. certain families or tribes left northern Susiana and entered China, after an element of feudal agglomeration had commenced in the kingdom of Susa, and thus carried with them the rudiments of Akkado-Chaldæan culture.

NUMISMATIC SOCIETY.

April 15.—J. Evans, Esq., D.C.L., President, in the chair.—Mr. R. Watts was elected a Member.—Mr. Sheriff Mackenzie exhibited two Durham pennies of Edward II., having the limbs of the cross on the reverse formed of two croziers instead of one, as on Bishop Kellow's coins.—Mr. A. E. Copp exhibited two proofs in silver and one in copper (gilt) of the Paris Mining Company's Anglesea tokens, two varieties, 1787 and 1788.—Mr. Hoblyn brought for exhibition twenty varieties of the shilling of Charles II., many of them of great beauty, and some extremely rare.—Mr. A. Durlacher exhibited a fine specimen of the 1666 crown of Charles II., with the elephant under the bust; a sixpence of William III., 1700, with a minute plume under the bust; a very fine shilling of James II., 1685, and a sixpence of 1686; also, a milled shilling of Elizabeth, with the star mint mark.—Dr. A. Colson communicated a paper on the meaning of a well-known reverse type of a coin of Tarentum of the fourth century B.C., on which a youth is represented kneeling beneath a horse and examining his hoof. Dr. Colson pointed out that he could not be shoeing the horse, as some have supposed, as the Greeks never shod their horses, but hardened their hoofs by causing them constantly to stand and exercise upon hard stones.—Mr. S. Sharp sent a paper on some new coins of the Stamford mint; and Mr. B. V. Head read the second portion of his paper on "The Chronological Sequence of the Coins of Ephesus."

SOCIETY OF ANTIQUARIES.

April 15.—H. Reeve, Esq., V.P., in the chair.—Notice was again given of the anniversary meeting for the election of Council, President, Treasurer, and Director, and a list of the names of those proposed to fill those offices was read.—The Rev. I. G. Lloyd exhibited a wooden carving of the entombment of our Lord from a church in Havre, and two Russian polyptychs or hagioptychs, one in metal, with four leaves enamelled, and the other painted on fifteen leaves of wood.—Mr. A. W. Franks exhibited, by permission of Mr. T. M. Dodington, a beautiful gold ring of the fourteenth century, with the words "Iaspar, Melchior, Baltasar," inscribed on it. Mr. Franks also gave an account of the Greenwell collection, presented to the British Museum by the Rev. W. Greenwell, and comprising the results of twenty years' excavations in the barrows, chiefly of the north of England.—Mr. E. Freshfield, V.P., laid before the meeting an account of a Greek Creed, which occurs, transliterated, in a manuscript in the British Museum, known by the name of the Psalter of King Athelstan. In form it resembled the Apostles' Creed (so-called), but not without considerable variations, which Mr. Freshfield proceeded to point out, comparing it with other versions of that Creed, and especially with a Latin version in a Bodleian manuscript known as the Codex Laudianus.

April 29.—A. W. Franks, Esq., V.P., in the chair.—Mr. Franks's appointment as Vice-President was read.—Mr. R. Brown, jun., exhibited and presented a portrait of the poet James Montgomery, engraved from a drawing by Mr. Westeley.—Mr. E. Peacock exhibited a square tablet or amulet of lead with magical symbols, found when digging in or near the disused burial-ground of Kettleby, near Brigg.—Mr. Franks exhibited a rubbing of a similar tablet now in the British Museum.—Mr. E. Seebohm communicated a paper on "Serfdom in its Connection with the Open-Field System." The object of the paper was to examine the question whether the English open-field system in early Saxon times was the shell of a free village community or of a community in serfdom. It commenced with a brief recapitulation of the results of a paper read last year, in which the various features of the English open-field system—the little strips and balks and furlongs and linches by which it was marked—were traced back behind the Domesday survey and the Saxon charters and laws, and found to be existing also in Wales, and connected with a system of common ploughing with a team of eight oxen. It was shown that the yardland, the holding of the villanus of the survey, of the Saxon *gebur*, contributed two oxen to the common plough team, and consisted of about thirty acre or sixty and a half acre strips, scattered all over the open fields of the village, and that about three-fifths of the arable land of England was held in yardlands at the time of the survey. The inquiry was then entered upon whether in early Saxon as in Norman times these yardlands were held in serfdom, or whether they were the "alods" of freemen. Three Saxon documents, all of them well-known to former writers, and describing the services of the holders of yardlands, were examined under the fresh light given by the knowledge of what the yardland was, and of its importance as the normal holding of the villanus, or *gebur*. The first of them was the "Rectitudines Singularum Personarum;" the second, a charter of the manor of Tidenham, at the mouth of the Wye; the third, a charter relating to a royal manor of King Alfred. All three documents conclusively showed that the services of the yardland in the ninth and tenth centuries were as distinctly serfdom as anything after the Norman conquest, whilst the identity of phraseology between them and the laws of Ine throws the evidence back very much earlier into the Saxon times. The fact that serfdom was a Saxon imposition on the top of the open-field system which already existed in Britain was then further confirmed, first, by the identity of English serfdom with early Teutonic serfdom on the Continent, and, secondly, by the absence of anything similar to it in the Welsh system as disclosed in the Welsh laws. Further, from the Welsh system was drawn the inference that the two points—equality and community—which at first sight point to a free village community, may be really the notes of serfdom. It was shown that there could be no permanent equality of holdings with allodial ownership, the allodial law of equal division between heirs always necessarily producing inequality. Finally, serfdom was shown to arise naturally from conquest, and the prevalent rule of ancient races illustrated by the Welsh laws, which limited allodial freedom to freemen of their own race, acknowledging no rights of inheritance in strangers and conquered peoples. In conclusion, it was pointed out that all the lines of evidence conspire to show that serfdom was imposed upon the open-field system in Britain at the Saxon conquest, and that under Saxon rule in England the open-field system was from the first not the shell of a free village community, but the shell of a community of serfdom.—At the close of this paper a discussion ensued, in which Mr. Justice Fry, Messrs. S. Moore, L. Gomme, and H. S. Milman took part. The general purport of the criticisms offered was to show that Mr. Seebohm appeared to have not taken account of those evidences of freedom in Saxon times which were embodied in the existence of the manorial courts, such as the Court Baron, the Court of the Free Peers. "Whence, if not from the Saxons," said Mr. Justice Fry, "did this court come? On Mr. Seebohm's theory the Court Baron was a residual phenomenon."—Mr. S. Moore observed that Mr. Seebohm took too severe a view of the so-called serfdom of the ancient tenant. The services which he is described to have rendered were rather in the nature of rent; at a time when currency was relatively scarce labour became its equivalent. He thought it would be found that the decrease of the prædial services was concurrent with the increase of currency. It was then no longer necessary to pay rent in the shape of labour.

ROYAL INSTITUTION.

MAY 1.—Annual meeting.—G. Busk, Esq., Treas. and V.P., in the chair.—The Annual Report of the Committee of Visitors for the year 1879, testifying to the continued prosperity and efficient management of the Institution, was read and adopted. The real and funded property now amounts to nearly £85,000.—The following gentlemen were elected as officers for the ensuing year: President, the Duke of Northumberland; Treasurer, G. Busk, Esq.; Secretary, Warren De La Rue, Esq.; Managers, Earl Bathurst, G. Berkley, W. Bowman, Dr. T. Boycott, F. J. Bramwell, J. Brown, Earl of Derby, Captain D. Galton, Hon. Sir W. R. Grove, C. H. Hawkins, W. W. Lloyd, H. Pollock, Dr. J. Rae, R. P. Roupell, and J. Spedding; Visitors, G. B. Buckton, S. Busk, The Lord S. Cecil, G. H. Darwin, W. H. Domville, J. N. Douglass, Right Hon. Lord Claud Hamilton, A. G. Henriques, Dr. R. Mann, J. F. Moulton, W. H. Preece, L. M. Rate, J. Romanes, Hon. J. G. P. Vereker, and E. Woods.

MAY 3.—G. Busk, Esq., Treas. and V.P., in the chair.—Mrs. B. Lees, Col. J. M. Innes, Messrs. S. E. Kennedy, E. Pollock, and C. Van Raalte were elected Members.

SOCIETY OF ENGINEERS.

MAY 3.—Mr. J. Bernays, President, in the chair.—The paper read was by Mr. G. Smith, on "The Design and Reconstruction of the Tay Bridge."

STATISTICAL SOCIETY.

APRIL 20.—W. Newmarch, Esq., in the chair.—Dr. Mouat, Foreign Secretary and Vice-President, read a paper on "The Education and Training of the Children of the Poor."

LINNEAN SOCIETY.

APRIL 15.—The Rev. G. Henslow in the chair.—Messrs. S. H. Wintle and G. Bay were elected Fellows.—A paper by the Rev. R. Boog Watson, on "The Mollusca of the Challenger Expedition," was read. Some thirty-five species are described, whereof the greater part are new forms, belonging to the families Solenoconchia, Trochida, Rissoellidæ, Littorinidæ, and Cerithiidæ. The author observes that temperature, even more than mere depth, seems an important condition in molluscan life, while both prove barriers to distribution, though great length of time naturally helps escape from these barriers. Where barriers of depth and temperature do not check distribution, there is no limit to universality of distribution, and such is the case with certain existing species; still there is no trace of especial lasting and progressive change.—A communication was read by Mr. N. E. Brown, on "Some new Aroidea, with Observations on other known Forms." Of the former, the specimens are contained in the Kew Herbarium, and the latter are annotations chiefly supplementary to Prof. Engler's recent monograph on the order. While following Engler the author has given preference to the classification of Schott. Among others several interesting new Bornean forms are described.—Prof. F. J. Bell next read a "Note on an Abnormal (quadriradiate) Specimen of *Amblypneustes formosus*," and afterwards Mr. C. Stewart exhibited and made remarks on another but differently abnormal specimen of the same species. Prof. Bell, after a full description, observes that, with more or less reason some naturalists have looked on the possession of other than five rays as a character of some specific value among the Asteridæ and Ophiurida, and have considered that, on account of its greater rarity among the latter, it is of greater value as a mark of distinction; but such a view must be taken with considerable limitation. The pentamerous arrangement of parts in the regular Echinoidea is there only disturbed in one example; information and specimens are, however, at hand to show how this may have happened; the rarity of any divergence from this five-part division, in face of the numerous variations which occur in the Echinodermata, will doubtless become more and more important as a factor in determining the genealogical history of the group.—A series of microscopical sections of pearls, exhibiting many irregularities in structural detail, were shown by Dr. J. Murie, and their several pecularities explained.

MAY 6.—H. T. Stainton, Esq., in the chair.—Three foreign members were elected.—Mr. T. Christy read a letter from Mr. Blacklaw, of St. Paulo, Brazil, announcing that his experiments to rear the Liberian coffee plant had all failed, though different seasons, altitudes, and other conditions without and indoors had been tried.—The abstract of a paper by Prof. G. Dickie, "Notes on Algæ from the Amazon," was read by the Secretary. This collection was made by Prof. Traill, and consists of 288 species, whereof 190 are Diatoms, 31 Desmids, and 63 other Algæ, 9 of the last being new forms.—Prof. P. M. Duncan orally communicated the substance of a paper on "An Unusual Form of the Genus Hemipholiss, Agass." This was dredged by Dr. Wallich off the Agulhas Bank, south-west of the Cape of Good Hope. Its zoological position may be doubtful, for the classification of the Ophiuroidea is at present full of anomalies, but the specimen itself nevertheless possesses unusual interest from the nature of the so-called dental or chewing apparatus. These peculiar oral structures and other points were elucidated by the author.—Mr. G. T. Bettany gave some remarks on the vocabulary of botanical terms in use in the description of flowering plants. The author advocated making a distinction between terms used in elementary descriptions in educational works and those used in the terse and complete floras. Under evolution there was much chance of botanical progress if terms were simplified and made such as children could comprehend; but almost every book aiming at comprehensiveness became obscure. Thinking it necessary to give every possible variety of terms, and to add to them, it repelled instead of aiding in the wide diffusion of knowledge. For these and other reasons the author strongly objected to the now too frequent use of tri- and poly- syllabic terms.—Prof. Ray Lankester read a paper on "The tusks of the Fossil Walrus found in the Red Crag of Suffolk." He withdraws the generic name of Trichecodon, instituted by him in 1865, and refers a series of later discovered large tusks in the Ipswich Museum, as also his formerly described specimens, to the living genus Trichechus, but specifically distinguished in this case as *T. Huxleyi*. He is inclined to think there is insufficient ground for the generic subdivisions Alachtherium and Trichecodon as used by Van Beneden, and, moreover, signifies his opinion that there is yet no good evidence in support of the association of the Suffolk and Antwerp tusks.—A short communication on "An Irregular Species of Amblypneustes," by Mr. C. Stewart, was taken as read.

CHEMICAL SOCIETY.

APRIL 15.—Prof. H. E. Roscoe, President, in the chair.—The following papers were read, on "The Lecture Illustration of Chemical Curves," by Dr. E. J. Mills. The author has contrived an apparatus for exhibiting the variations in the actions of sulphuric acid on zinc and sodic hydrate on aluminium produced by alterations (1) in the strength of the solution, (2) in the time during which the action is allowed to proceed; on "The Analysis of Organic Bodies containing Nitrogen," by Mr. W. H. Perkin; on "The Volatilisation of Solids in Vacuo," by Mr. W. D. Herman; on "The Determination of Nitric Acid as Nitric Oxide by means of its Reaction with Ferrous Chloride," by Mr. Warington. The author describes an apparatus for the above purpose. The air is expelled by carbon dioxide, the nitrate heated by a calcium chloride bath to 125 degrees C., and the nitric oxide measured as gas. Organic matter does not affect the results; on "The Six Possible Isomeric Dibromtoluols and other of the Bromo and Bromonitro Derivatives of Toluol related thereto," by Messrs. R. Nevile and A. Winther. The authors criticise the results of Wroblevsky, *Jahr.* 1870, 528, and 1871, 450, and establish the conclusion that in such bodies the bromine never occupies a position which is "meta" to the amido group.

May 6.—Prof. H. E. Roscoe, President, in the chair.—The following papers were read on "The Action of Sodium on Phenylic Acetate," by Messrs. W. H. Perkin, jun., and W. Hodgkinson. Hydrogen, acetic ether, phenol, acetic acid, salicylic acid, a white crystalline substance melting at 48° C, having the composition $C_{15} H_{12} O_3$, and a yellow crystalline substance melting at 138°, having the composition $C_{18} H_{14} O_4$, were obtained; by heating cresylic acetate and sodium, acetic ether and salicylic acid were formed; "Preliminary Notice on the Action of Sodium on some Ethereal Salts of Phenylacetic Acid," by Dr. Hodgkinson; on "The Determination of Nitrogen in Carbon Compounds," by Mr. C. E. Groves. The author described and exhibited an improved and simple apparatus for facilitating the collection and measurement of the nitrogen evolved during the combustion of a substance according to Dumas's method; on "Essential Oil of Sage," by Mr. M. M. P. Muir; on "The Presence of Nitrogen in Iron and Steel," by Mr. A. H. Allen. By passing steam over iron at a red heat, and also by dissolving iron in hydro-chloric acid, the author has satisfactorily proved that ammonia is formed equal to 0·0041 to 0·0172 parts of nitrogen per hundred parts of iron or steel; on "The mode of application of Pettenkofer's Process for the Determination of Carbonic Acid in Expired Air," by Dr. W. Marcet. The author describes and figures a portable apparatus which he has successfully used in upwards of 350 determinations of carbonic acid, made during some investigations on the effect of altitude on the phenomena of respiration; on "An Improved Form of Oven for heating Sealed Tubes and avoiding Risks of Explosions;" and "Note on a Convenient Form of Lead Bath for Victor Meyer's Apparatus for determining the Vapour Densities of High-Boiling Substances," by Mr. W. Smith.

PHOTOGRAPHIC SOCIETY.

April 6.—J. Glaisher, Esq., President, in the chair.—The following papers were read, on "Principles of Optics involved in Lantern Construction, and on a new Enlarging Lens, especially designed for use with the Magic Lantern," by Mr. J. H. Dallmeyer,—a new condenser and objective lenses were shown and described; on "The Use of Silver Iodide in a Gelatino-bromide Emulsion," by Capt. Abney, where no loss of sensitiveness took place, and yellow light could be used for working in; and on "A Drying Box for Gelatine Plates," by Mr. W. England.

ANTHROPOLOGICAL INSTITUTE.

April 13.—Major-General A. Lane Fox, V.P., in the chair.—The Director read a paper on "Fijian Burial Customs," by the Rev. L. Fison. There is no uniformity of custom in Fiji, so that no description of what is done by any one tribe can be taken as applicable to all the others. The strangling of widows, however, that they might be buried with their dead husbands, seems to have been everywhere practised. The widow's brother performs the operation, and is thenceforward treated with marked respect by his brother-in-law's kinsfolk, who present him with a piece of land, over which the strangling cord is hung up. Should he, however, fail to strangle his sister, he is despised. When a woman is about to be strangled she is made to kneel down, and the cord (a strip of native cloth) is put round her neck. She is then told to expel her breath as long as possible, and when she can endure no longer to stretch out her hand as a signal, whereupon the cord is tightened, and soon all is over. It is believed that if this direction be followed insensibility ensues immediately on the tightening of the cord, whereas if inhalation has taken place there is an interval of suffering. According to Fijian belief, at a certain place on the road to Mbulu (Hades) there lies in wait a god called Nangga-nangga, who is utterly implacable towards the ghosts of the unmarried, and he classes as bachelors all male ghosts who come to him unaccompanied by their wives. He lifts them above his head, and breaks them in two by dashing them down on a projecting rock. If the wife die before her husband, the widower cuts off his beard, and puts it under her left armpit. This serves as her certificate of marriage; and, on her producing it to Nangga-nangga, he allows her to pass. On the island of Vanua Levu a noted "brave" is distinguished from the common herd after death by being buried with his right arm projecting above the grave-mound, and passers-by exclaim with admiration as they look upon the fleshless arm, "Oh, the hand that was the slayer of men!" By many tribes the burial-place of their chief is kept a profound secret, lest those whom he injured during his life should revenge themselves by digging up and insulting, or even eating, his body. Cave burial is common, although by no means universal; in some cases artificial caves are made, On the death of the king of the Nakelo tribe three old men come, with fans in their hands, and conduct the spirit to the banks of the river. Here they call upon Themba—the Nakelo Charon—to bring over his canoe, and wait until they see a wave rolling in towards the shore, which they say is caused by the approach of the invisible canoe; they then avert their faces, point their fans suddenly to the river, cry aloud, "Go on board, sir," and forthwith run for their lives, for no eye of living man may look upon the embarkation. The grave is dug about hip deep, the body laid in it, and an old cocoa-nut is broken by a blow with a stone, being so held that the milk runs down upon the head of the corpse. The meat of the nut is then eaten by the three elders, and the grave is filled up.—A paper on "The Polynesian Race," by Mr. C. Staniland Wake, M.A.I., was read. The author proposed to show, first, that the Polynesian islanders must be described as a bearded rather than a non-bearded race, and, secondly, that as a rule, they are well acquainted with the use of the bow and arrow, and quoted the observations of numerous travellers in support of his view.—Major-General A. Lane Fox exhibited some paintings and bead mats, the work of Bushmen.

April 27.—Major-General A. Pitt Rivers, V.P., in the chair.—Mr. E. T. Leith was elected a Member.—A paper entitled "Further Notes on the Romano-British Cemetery at Seaford, Sussex," by Messrs. F. G. H. Price and J. E. Price, was read. It was a continuation of one read before the Institute by the same authors in November, 1876. During the summer of 1879 these gentlemen again visited Seaford, and made further excavations in the Roman Cemetery upon the Downs, in which they discovered several urns, a drinking cup of Durobrivian pottery, Samian pateræ, flint celts of the neolithic type, and many flint flakes. In one particular interment a large urn full of charred human bones was discovered, having a Samian cup in its mouth for the purpose of keeping out the earth; another cup, of elegant form, of Durobrivian ware was found on its left side, and a food vessel and patera of Upchurch pottery on the right side. In close proximity to this interment was a similar one; the urn was much crushed, but beneath a patera of Samian ware a coin of Faustina Junior, the daughter of Antoninus Pius and wife of Marcus Aurelius, was found. This was most important as giving an approximate date to the interments; they could not be earlier than between A.D. 161 and 180. In another part of the Downs, in a place called the Little Burys, black patches were of frequent occurrence in the sand, which were composed of charcoal, fragments of burned bone, a flint flake or two, and frequently iron nails. In one particular spot a batch of over ninety iron studs was found, mixed up with bone ashes and charcoal. The authors considered that the patches of charcoal without an urn indicated pauper burials, or the burials of soldiers, as this place was a military station. The pottery and other relics discovered were exhibited.—General A. P. Rivers exhibited a series of plans and relics from Mount Caburn.

ENGLISH SPELLING REFORM ASSOCIATION.

April 20.—A. J. Ellis, Esq., in the chair.—The Rev. W. S. Lach-Szyrma read a paper on "International Spelling Reform." In it he discussed the possibility of framing a system which, beyond English, should include all the important languages of the civilised world.—Systems hitherto proposed for that object were too complicated for general use; even that of Lepsius, which the lecturer preferred, erred in the multitude of its diacritics. Practically, the basis for a new system was either the Roman or the Cyrillic alphabet. The latter was based upon a perfectly phonetic theory, and was used by a large portion of mankind; but it seemed very doubtful whether it would ever be accepted by Western Europe. We were, therefore, driven to the Roman alphabet as the only practical base. The lecturer then expounded his own suggested alphabet, in which the vowel signs were used for the short Italian vowels, and the long vowels and various modifications of the consonants were indicated by simple diacritical marks, such as a dot or an accent. Mr. Lach-Szyrma pointed out the great advantages in learning to read one's own and foreign languages, and concluded by suggesting a congress of spelling reformers for the discussion of questions relative to international reform.—In the discussion which followed Messrs. Pfoundes, Ball Pagliardini, Fleay, the Rev. J. Long, and the chairman took part.

EDUCATION SOCIETY.

April 21.—Rev. Canon Daniel in the chair.—Rev. R. H. Quick read a paper on "The Educational Principles of the Jesuits." He pointed out that the chief merits of the system were the careful study of individual character, the manner in which emulation and interest were excited, and the continuity of the teaching throughout the school secured by the constant supervision of the rector, who himself took no class.

FOLK-LORE SOCIETY.

April 13.—E. Solly, Esq., F.R.S., in the chair.—The Rev. J. Long read a paper on the importance of publishing a complete collection of proverbs in English, Welsh, Erse, Gaelic, Cornish, classified according to subjects, with explanatory notes. The question in its various aspects was illustrated by quotations from proverbs European and Asiatic; a reference was also made to the Gipsies, whose line of route along the Danubian valley can be traced by the Slavonic and Greek proverbs they have incorporated into their language. Mr. Long submitted to the meeting proposals for the best mode of collecting and classifying the proverbs of England and their parallels in other lands.—Mr. J. S. Udal read a paper on "Dorsetshire Mummery Plays." After having pointed out the general value of the subject, Mr. Udal proceeded to give an account of a play now acted in Dorsetshire.—Among those who took part in the discussions of the papers were Dr. Hyde Clark, who stated that the Smithsonian Institute was collecting mummery plays; Mr. Coote, who gave some interesting proverbs from Pitrè's great collection; Mr. Nutt, who pointed out some parallels between folk-tales and the mummery plays; Mr. E. Walford, the Rev. W. S. Lach-Szyrma, Mr. Pfoundes, Dr. Cheevers, and Mr. G. L. Gomme.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

May 4.—Dr. S. Birch, President, in the chair.—The following communications were read, "Libation Vase of Osor-ur, preserved in the Museum of the Louvre," by M. Paul Pierret; "Monuments of the Reign of Tirhaka," by Dr. S. Birch; "An Examination of the Assyrian Ideograph *Mi*," by Mr. R. Brown, jun.; and on "The Expression in Assyrian of the Soft Sound of the Hebrew *Ain*," by Mr. R. Cull.

MUSICAL ASSOCIATION.

May 3.—Prof. W. H. Monk in the chair.—A paper was read by Mr. C. K. Salaman, on "Music as a Profession in England." Mr. Salaman surveyed his subject from two points of view—the purely artistic and the purely professional; by the former meaning the practice of music with reference alone to the art, its cultivation and progress, and by the latter the practice of music as a source of income; observing that while giving full consideration to the emoluments of his profession, the true musician will never ignore his obligation to art, but will uphold its dignity, and guard with jealous care its inherent purity from every contaminating influence. The necessary qualifications of the successful musician, whether composer, performer, or teacher, were reviewed by Mr. Salaman, who also illustrated his paper by many anecdotes and reminiscences of his personal experience during the last half century.

Mr. William E. Ferguson, of New York City, has patented an improved device for preventing the shifting of grain cargoes in vessels, and to strengthen the vessel at its weakest point, or at the point exposed to the greatest strain when the vessel is loaded to the dead-weight capacity with a cargo of grain.

A water and wind mill, which the inventor designates a "wing-motor," of especial simplicity of construction, automatic in the adjustment of its sails, and capable of utilizing a large percentage of the power of the wind and current of water, has been patented by Mr. J. L. Nevers, of Pass Christian, Miss.

Messrs. John Henderson, Jeremiah H. Henderson, and Justin Notson, of Leon, Iowa, have patented a churn by means of which large and small quantities of butter can be produced, as may be desired, and which is easily operated, and is simple in its parts. It consists of the arrangement of two dashers, which are operated by means of two discs provided with pins that take in the slotted shafts of the dashers, these discs being fastened to the end of a horizontal shaft, which is rotated by means of a crank and bevel gearing.

Mr. Jacob G. Fletcher, of Washington, D.C., has patented for artists' use an improved canvas stretcher which shall have all the qualities experience has decided to be necessary or most desirable, and it consists in constructing the bars or pieces composing the stretcher proper with plain mitre joints, which are opened by means of wedges, and in providing said bars with holes and grooves for the purpose of receiving the fastening device, which is constructed of metal and approximately U-shaped, and when applied to the stretcher frame is sunk or embedded in the wood flush with the surface thereof.

Messrs. James Skidmore, Joseph M. Liston, and Orestes Skidmore, of Charleston, Ill., have patented an improvement in hame tugs for connecting the hames with the traces in the ordinary form of harness. It consists in the peculiar construction and arrangement of the metal clip or plate in connection with the leather tug.

Mr. James C. Stanley, of New Hartford, Conn., has patented certain improvements in the thread boards and thread guides of spinning and twisting machines, whereby the thread guide can be adjusted so that the threads, when delivered from the rolls, will run through the guide centrally with the spindle tip, and thereby escape the usual stretching and breaking.

An improvement in spring vehicles, patented by Mr. William B. Thomas, of Elmira, N.Y., is designed to keep the back springs of a spring waggon under a slight strain when there is no load in the rear part of the waggon, to prevent the rattling and undue wear of the spring joints, and to cause the waggon to ride easier.

An improved ticket holder has been patented by Mr. Samuel Herzberg, of Pontiac, Ill. It is designed for holding the tickets on which are marked the sizes and other particulars of goods, such as pantaloons and other clothing.

Mr. Emile F. Espérandieu, of Nashville, Tenn., has invented a velocipede of the tricycle class which is adapted for carrying packages, merchandise, or any articles of light weight, and which may be propelled by working swinging treadles having springs that aid in moving them backward.

Mr. Archibald H. Kerr, of Midway, Texas, has patented a composition for whitewashing houses, walls, fences, outbuildings, &c., designed for great smoothness, brilliancy, and durability; and it consists in a compound of lime, whiting, plaster of Paris, glue, carbonate of soda, biborate of soda or borax, and sulphate of soda, in certain specific proportions.

Messrs. Ebenezer Fisher and John Watson, of Kincardine, Ontario, Canada, have patented an improved die for forging metallic horse collar frames. This die has been developed after a long series of experiments. With it the desired perfection of operation and result may be obtained with certainty and precision, and a collar frame produced having the desired form, proportions, and lines of curvature required for greatest strength and lightness combined.

An improved adjustable seat for mowers, reapers, wheeled horse hay rakes, and various other agricultural machines, for farm waggons and other vehicles, or for use in any other situation in which it may be applicable, has been patented by Messrs. Samuel Hedges, of Wheeling, and Lewis B. Morgan, of West Liberty, West Virginia. It is capable of oscillation or adjustment laterally on a fixed point of support, so that it may be kept in horizontal position despite the lateral inclination of the body of the machine or vehicle while passing along a hill side or other inclined surface.

Mr. John B. Fogt, of Anna, O., has patented an improvement in that class of riding rakes in which the wire teeth are attached to the axle, and the driver's seat attached to the hinged thills or shafts, so that upon releasing a locking lever the rake will be dumped automatically by the weight of the driver.

Mr. Talbot C. Key, of White Sulphur Springs, Ga., has patented a portable hay and cotton press, an improvement in the class of portable presses which are mounted on wheels and thus adapted to be conveniently transported from one locality to another without requiring a separate vehicle therefore. The invention consists in hinging the press box to the beams of the truck, so that it can be laid down on its side, for the purpose of transportation, &c., and in the means for securing the press box in the vertical position when required for work.

Mr. David C. Williams, of Florence, Ala., has invented a fruit picker, which consists in a ring fixed on the end of the staff, and having wire fingers projecting from its top portion for the purpose of detaching fruit; also, a basket or fruit receptacle pivoted to and within said ring, so that when the picker is put in use the inclination of the staff or pole will cause the basket to tilt, and one edge thereof to approach the wire fingers, which are holding and pulling the fruit, and hence when the latter falls it is sure to pass into the basket or receptacle.

Mr. Charles S. Peach, of North Adams, Mass., has patented an improvement in ring spinning frames, the object of the invention being to prevent the threads from throwing out and interfering with each other, and to equalise the tension and draught on the thread, whereby the yarn will be wound on the bobbin equally hard and close at top and bottom.

Mr. Heinrich Seck, of Frankfort-on-the Main, Germany, has patented a preparatory bolting machine so combined with a fine dressing machine that it serves for separating the husks, bran, and coarser particles from the meal, and for sorting the meal itself into different degrees of fineness at one operation.

Mr. Alanson Cary, of New York city, has patented a machine for manufacturing metallic barbed ribbon for the wire used for fences so as to give to such a wire a barbed edge. The invention consists in a machine combining a reciprocating head carrying the cutters, a feed bed, and die plate, feeding rollers, and an intermittent feed motion, whereby the ribbon is fed forward beneath the cutters, and the operation performed rapidly without waste of material.

Messrs. John E. Best and William E. Higgins, of Arlington Heights, Ill., have patented an improved thill coupling jack for compressing the rubber in a thill coupling to allow the thill eye or coupling bolt to be readily inserted.

An improvement in machines for depositing fine and powdered substances in uniform quantities in packages, has been patented by Mr. James McCrodden, of New York city. The machines are so constructed that they may be readily adjusted for forming larger or smaller packages. They are convenient in operation, filling the packages quickly, and allowing them to be readily inserted and removed.

Mr. Winfield S. Reeve, of Riceville, Iowa, has patented an improvement in trimming shears for blacksmiths' use. The invention consists in connecting the cam lever with the movable jaw by a slotted plate, so that the operator may stand behind and over his work, thus being enabled to cut to a line.

Mr. Robert F. Dobson, of Darlington, Wis., has patented improvements in that class of weighing scales in which the weight of the object to be made is made to deflect a lever over a curved scale bar, and throw a weight carried by the lever into a position approaching more nearly the horizontal, in which the leverage of said weight is greater.

Messrs. Charles H. Spray and Edward M. Bush, of Seymour, Ind., have patented an improvement in the class of ovens of cooking stoves and ranges whose doors have a movable shelf so connected therewith that the opening and closing of the doors will slide the shelf along the bottom of the oven. The improvement relates to a shelf or false bottom, which is made the full size of the true bottom of the oven chamber, and is supported in guides and moved out and in, as the door opens and closes, by means of a rack and a segmental toothed lever that is connected with and operated by the door.

An improved axle box, patented by George W. Thomas, of Bear River, Nova Scotia, is applicable to carriage, wagon, car, and to all other shafting. The invention consists in the combination with friction rolls of an axle box journaled in rings connected by diamond-shaped bars extending the whole length of box.

A novel and simple apparatus to be used in the process of making ice by the absorption or pumping of ammonia gas, has been patented by Mr. Andrew J. Zilker, of Austin, Texas. The invention consists of two or more sheets of galvanized iron or other metal set in a tank of fresh water, one on either side of the evaporation pipes, and held in a position parallel to each other by anchors or yokes that connect them.

Mr. George E. Bigelow, of Geneva, Neb., has patented an improved water elevator which consists of a conical axle carrying a chain or rope to one end of which a weight is fastened, said axle supporting also a wheel or pulley which carries a chain or rope, one end of which is attached to the wheel and the other end to a bucket.

Mr. William H. Hottel, of Woodstock, Va. has patented an improved alarm attachment for grist mills, designed to give a distinct alarm for indicating the irregularity of speed, whether in a mill or other class of machinery, which may be heard at any part of the mill, or which, by the aid of a telephone, may be heard at an office, residence, or other point remote from the machinery.

A stationary steam boiler, composed of hot water, steam, feed water, and air tubes laid horizontally, in coils or sections, one above another, in the order named, in a brick fire chamber, and having all the tube couplings and connections outside of the brick work, so that they may be readily got at for examination or repairs, and having also the steam and mud drums outside of the brick work, has been patented by Mr. Milton W. Hazelton, of Chicago, Ill.

An improved rubber bracelet has been patented by Mr. David Stone, of New York city. The object of this invention is to furnish rubber bracelets simple and inexpensive in construction and neat and ornamental in appearance. The invention consists in constructing rubber bracelets with extensions upon the opposite side edges of the band to represent buckles; also, in forming slots in the said extensions, and also in the combination, with the slotted extensions, of the cross bar placed upon the inner side of the band, with its ends projecting through the slots and resting upon the side extensions.

Mr. Abraham Van Winkle, of Newark, N.J., has patented a novel frame for anodes, the object being to prevent the falling apart of the particles or pieces of the anode after it has become disintegrated by the action of the electric current while hanging in the solution without substantially interfering with the exposure of the surfaces of the anode to the solution. The invention consists in combining a frame of wood or other suitable material with the edges of an anode of cast or rolled metal.

Mr. Daniel Dunscomb, of New York city, has patented an improved cover designed especially for dredging boxes, or for boxes intended to hold powders of any kind. It consists in a cover, preferably metallic, having a central aperture, and of a perforated metallic cap having a downward projecting notched elastic rim. This cap is removably fitted into the aperture of the cover.

Mr. Nathaniel Pyles, of 43, Canal-street, Chicago, Ill., has patented an improved carpet and floor dust receiver. The object of this invention is to provide a dust-pan or receiver that may be pushed along in front of the person sweeping by the broom as the carpet is being swept in the usual way, to receive all of the dust and dirt raised or swept up by the broom and carry it along until the entire floor has been swept.

An improved plough has been patented by Messrs. Peter S. Swartz and Alexander Arnot, of Lexington, Mich. The object of this invention is to provide a double-ended plough so arranged that its movement can be easily reversed at the end of the furrow. The invention consists of a double-ended plough having the beam head, to which the beam and the handles are attached, pivoted to a plate on the upper end of the land side in such a manner that the motion of the plough can be reversed by simply turning the handle and beam around the pivot, the body of the plough not being changed in its position.

Mr. Francis Law, Sr., of East Orange (Bloomfield P.O.), N.J., has patented an improved hat-flanging machine, so constructed that the sand-weights can be conveniently raised and lowered upon the flanges to press the brims of hats. The invention consists in constructing a hat-flanging machine of a frame having table and bench, a suspended sand-weight, a carriage and track for carrying the sand-weight, uprights, and a treadle for raising and lowering the sand-weight.

An improved breech-loading firearm has been patented by Mr. George H. Fay, of Morrison, Ill. This invention relates to improvements in firearms composed of a number of fixed barrels, and to the mode of firing the arm; and the object of the invention is to give a wider range in the arm, and thus increase its effectiveness; also to arrange the firing devices so that all the barrels may be fired simultaneously or singly.

Mr. James O. Hands, of Louisville, Ky., has patented a novel device for automatically delivering coins for the purpose of facilitating the ready making of change. The invention consists of a box or case containing a number of receptacles for holding coins of different sizes, of automatic devices for delivering the coins and sounding an alarm as each coin is delivered, or as the drawer is opened, and of novel devices for locking the drawer and the delivery slides.

Mr. Peter W. Nelson, of Moline, Ill., has patented a device of especial convenience to shopkeepers, whereby barrels of groceries or other articles may be supported and readily swung in and out under the shop counter. The invention consists of a vertical bar having at each end a laterally extending hook or clasp, the upper hook or clasp being vertically adjustable, said bar being pivoted above in the under side of the counter, near its edges and below in the floor, so that it can be turned outward to receive a barrel between its hooks or clasps and be swung around to carry the barrel under the counter.

Mr John H. Gable, of Shamokin, Pa., has patented an improved pipe cleaner for cleaning deposits of sediment from the inner surfaces of the column or pump pipes of mine shafts and slopes and for cleaning out other pipes. The invention consists of a pipe cleaner formed of a cylinder or frame provided with cutters to loosen the sediment, wheels to crush and pulverize the sediment, and a brush to sweep the inner surface of the pipe.

A Railway with some novel features has been recently opened between the station of Ribeauvillé (on the Strassburg Basle line) and the town of that name, about 4 kilom. distant. The line is on the road (with which the rails are level), and has a narrow gauge of one metre. There are inclines of forty mm., and curves of fifty metres radius. The train requires only one engineer and one guard. The locomotives weigh nine tons, and among the rolling stock are ten platform waggons, which are arranged for conveying waggons from the main line, without the goods being transferred. These platforms carry two rails, corresponding to the normal larger gauge, and they rest on two bogie trucks, having four wheels each. Thus the larger waggons can be conveyed over the sharpest curves of the narrow line. These platform waggons weigh three tons, and the large waggons, with full charge, weigh fifteen tons, giving a total weight of eighteen tons, which, divided among the four axles, gives a maximum load of only four tons fifty per axle. Passengers, as well as goods, are conveyed on the line. The total cost of the line has not exceeded 250,000 francs.

A Royal Masonic Pupils' Assistance Fund having recently been established, a bazaar and fancy fair was recently held—both inclusive — at Freemasons' Tavern, Great Queen-street, W.C. The fund is under the patronage of the Prince of Wales, Grand Master of England, the Duke of Connaught, Prince Leopold, the Duke of Abercorn, Grand Master of Ireland, Sir R. M. Shaw-Stewart, Bart., Grand Master of Scotland, the Earls of Carnarvon, Lathom, Ferrers, Percy, M.P , the Marquis of Hartington, M.P., and many other distinguished Freemasons. Among the Lady Patronesses of he bazaar and fair were the Duchess of Athole, the Countesses of Lathom and Rosslyn, Ladies Henniker, Londesborough, &c. We trust this movement will lead to great advantage to the fund.

The Vesuvius Railway.—Tourists are now able to visit the crater of Vesuvius without the labour of climbing, the railway being complete. The depot is situated at a height of 810 metres, or 210 metres above the Observatory. A restaurant and café capable of accommodating 100 people is attached to the depot. The angle of inclination of this railroad attains at various points 40°, 50°, and 63°. There are two passenger cars, the Vesuvius and Etna, accommodating 12 persons each. The system adopted in the construction of the railway is of American invention, and is known as "the prismatic system."

If an invention is worthless and it fails of public support, no one suffers but the inventor. If it is good and succeeds, the whole world reaps the benefit. The public, which pays nothing in the one instance and gains enormously in the other, is thus vitally interested in the encouragement of inventions and the upholding of our patent system.

The Conversazione of the Institute of Civil Engineers took place at South Kensington Museum on the 23rd ult. The company, which this year included ladies, were received by the President, W. H. Barlow, Esq., whose invitations were accepted by a numerous and brilliant assemblage.

THE INVENTORS' INSTITUTE,

ESTABLISHED 1st MAY, 1862.

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